THE AUTOMOBILE

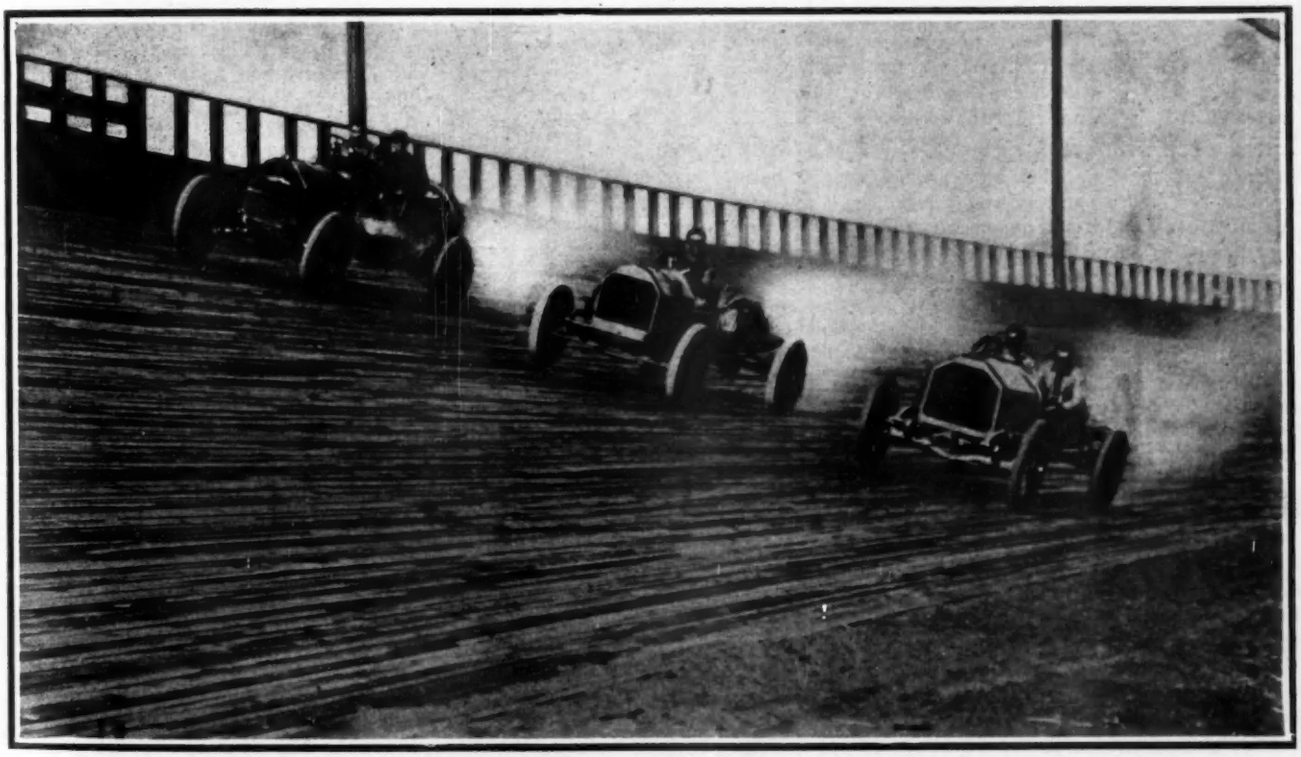
LOS ANGELES MOTORDROME OPENING

LOS ANGELES, Apr. 13—Racing began at the Motordrome on last Friday under favorable auspices with a scheduled meet of seven days, and from indications, thus far, it is anticipated that the closing on Saturday will be in a blaze of enthusiasm. The Motordrome is more interesting than it otherwise would be, because it is along absolutely new lines, and represents something definite; with the expectation that it will prove out the real capability of the circular track. Heretofore, circular track work was hampered by unavoidable but interfering considerations. Tracks laid out specifically for horse racing offered so many disadvantages that failure to make speed made it impossible for experts to decide as to whether or not the shortage was due to centrifugal force, and other true phenomena, which belong properly to the circular track, or to lack of suitable characteristics of the roadbed.

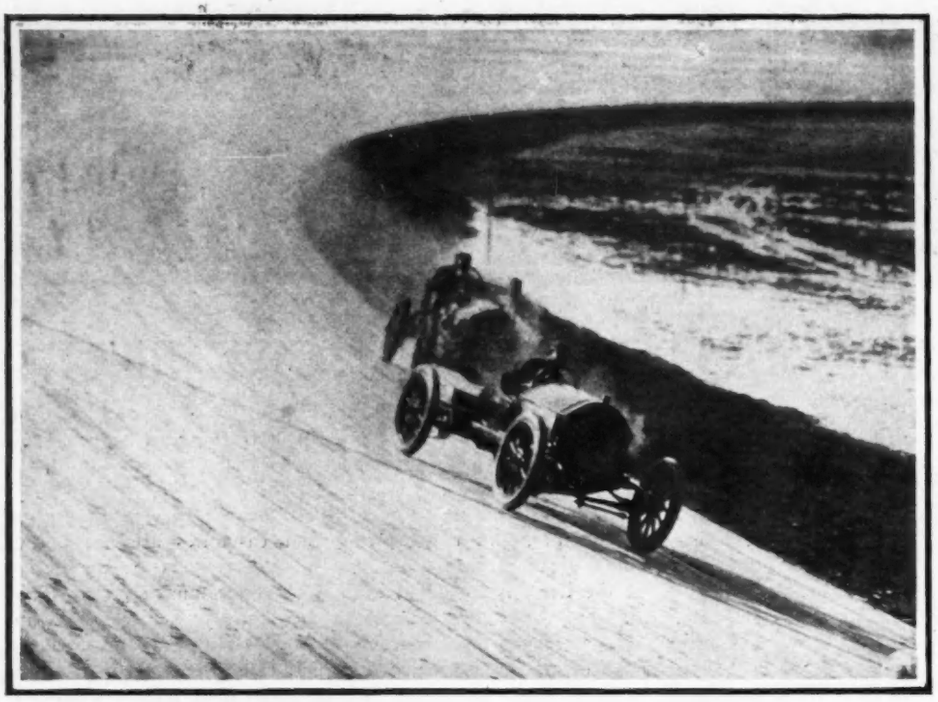
In this case the track is one mile in circumference. The width of the track available for the cars is 45 feet, and the outer edge of the same is 15 feet higher than the inner edge. The amount of the embankment, therefore, is represented by an elevation of 15 feet in 45 feet. A safety zone is provided around the inside of the track proper, which zone is 30 feet wide, made of dirt. The track proper is built up of 2 by 4 deal timber on edges, supported by a suitable framing which rests on vertical members, with a distance between bents which is regarded as consistent with the load to be supported, considering the ability of the 2 by 4 deal roadbed.

Anticipating a high rate of speed on the part of the racing automobiles, and remembering that casualties are possibilities which increase in the ratio of the speed squared, the design of the track is such that even if the embankment proves to be inadequate for the purpose, a further safety measure is induced through vertical backboard which runs all around the outer edge of the track, provided with T-rails, the first of which is 24 inches above the level of the platform, and the second is 7 inches (centers) above the first. It is anticipated that a car, in the event control is lost, will render a "swipe" below against the T-rails, and skid along for a sufficient distance to dissipate the energy represented in the moving mass, doing the least possible damage in the process.

Should a car take fire, which is within the range of possibility, a means is provided for prompt quenching of the fire, and this is deemed of importance, in view of the fact that the track is of wood, and remembering that water is not efficacious as a fire-fighting instrument in the presence of gasoline. For the purpose of quenching any incipient flame, a strip 5 feet wide runs all around inside of the dirt auxiliary track, which strip is composed



A SPEED BRUSH BETWEEN BUICK, COLE "30," AND APPERSON AUTOMOBILES ON LOS ANGELES BOARD TRACK



A LONG CHASE BETWEEN DE PALMA IN FIAT AND LESCAULT IN PALMER-SINGER

of sand in sufficient presence to serve for every requirement, and it is claimed by the track designer that it may possibly serve as a good landing place for a car if it runs wild, provided it travels in the direction of the axis of the circle.

AMPLE ACCOMMODATION FOR THE PATRONS OF THE TRACK

The grand stand stretches for 2,000 feet around the periphery of the track, and a box section for 1,000 feet. The box section is roofed over, and has accommodation for 3,000 people. In the grand stand the seats are six rows deep, and the seating capacity is stated to be 11,000 persons. Safety measures obtain at every point; access to the infield is by subways from without, and an aero club building is placed to one side of the field inside of the track. It includes every facility for the intended purpose. The infield is sufficiently large to afford ample maneuvering space for aeroplanes, and the spectators, from their point of vantage in the boxes or grand stand, could not be better placed.

A CONSIDERABLE UNDERTAKING

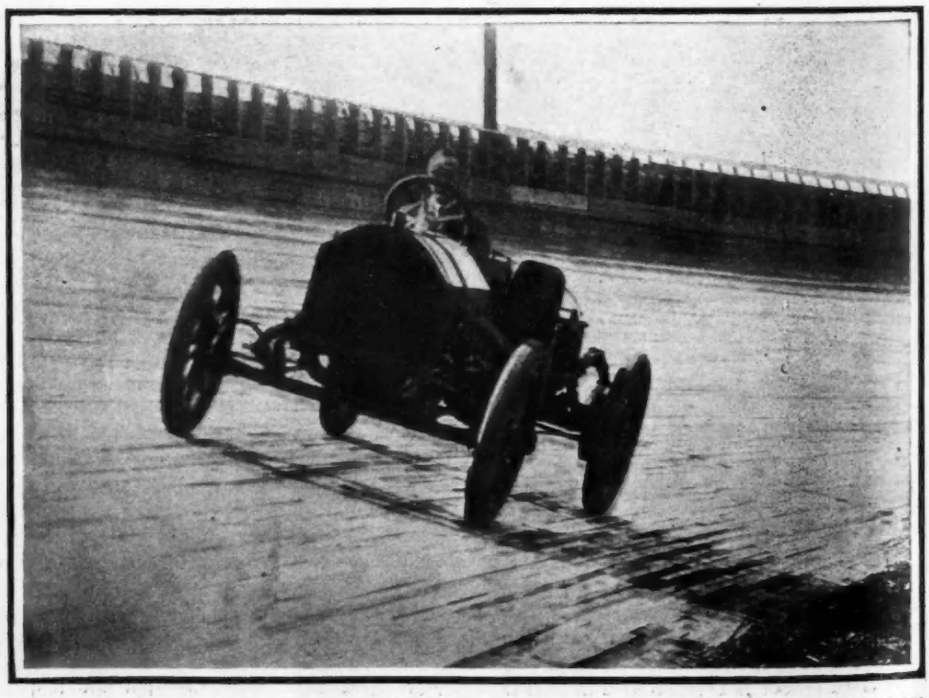
Visitors at the Motordrome will scarcely be in a position to judge of the enormity of the undertaking; they will hardly appreciate the fact that the building of the track called for the use of 3,000,000 feet of Oregon pine, nor is it possible to fully realize what it means to procure this material and whip it into shape within the short time which elapsed from the ordering of the material in December last to the official opening of the track on April 8. The actual work of building the track was started on February 1, and it went forward unceasingly to the finish, due to the foresight of the management, and the completeness of the plans which were made under the direction of Manager Moskovics, thus bringing into play the facility which comes from close application, taking advantage of wide experience.

Six repair pits are located in front of the boxes and extend around the circle for a distance of 300 feet; they are situated in a radial direction 40 feet in from the board track, and the space is covered by the same 2 by 4 scantling material as that of which the track proper is made. The repair pits are built in the light of experience under racing conditions, every facility is afforded for prompt and accurate work, and the location is such that the officials, the spectators and the press will be enabled to witness the rapid fire process which is so essential to success under racing conditions, and also to judge of the necessity and the character of the repair work undertaken. The press stand, which is well appointed and sufficiently commodious for the purpose, is located directly opposite repair pits.

LOCATION WELL SELECTED

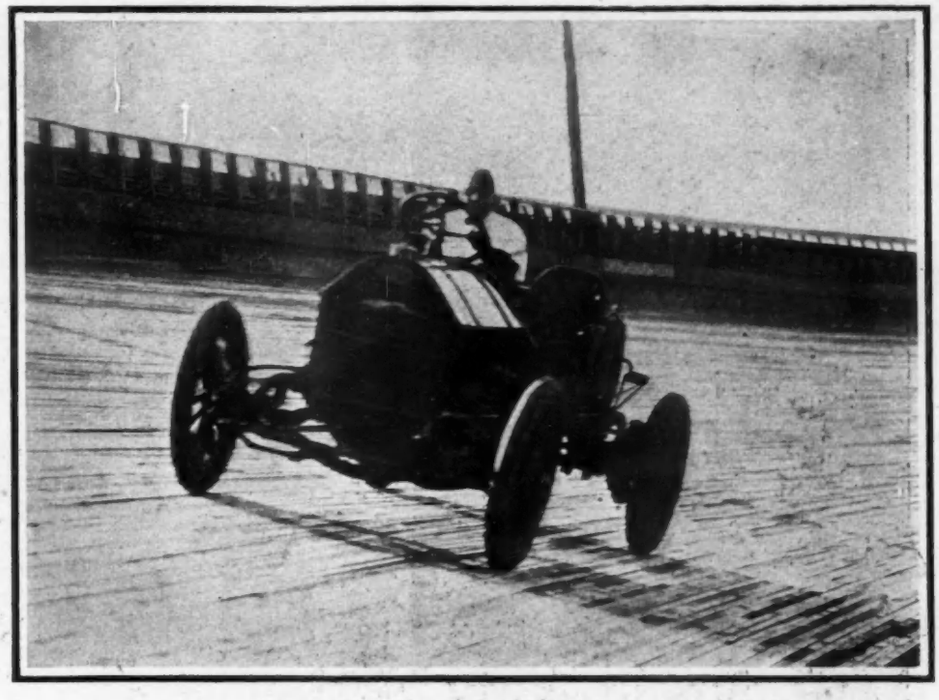
The distance from the ocean is barely three-fourths of a mile, and to Venice is 1 1-2 miles. Venice is a town with a population of 10,000, and it is 11 miles distant from Los Angeles. The transportation facilities are by means of two trolley lines, one of which is designated the Venice short line, and the other is the Playa del Rey road. A loop enters the outfield of the Motordrome, adjacent to the grand stand and the boxes, so that visitors who may not care to ride in automobiles will find the trolley efficacious, and the scenery as pleasant as the air is balmy. There are a large number of automobile owners in and about Los Angeles; it is the automobile center of the Pacific Coast, barring the rivalry of "Frisco" and vicinity.

The events scheduled for the present meet are, in the main, composed of stock chassis entrants, and the scheduled dis-



HARROUN, MARMON, DOING MILE IN 49 SECONDS PRELIMINARY TO SOME REAL WORK

tances are 5, 10, and 25 miles. Added interest is due to the longer distance races, one of which is for 100 miles, and a second is in the 160-230 class, another for the 230-300 class; then comes the 301-450 class, and finally the 451-600 class. The last named is the more formidable, unless it proves that the 24-hour event is, for which the prize is $1,000 in cash for the winner, $500 in coin for the second, $300 for the third, $200 for the fourth, and the right to participate for the rest. It is predicted that the two-hour race for stock chassis in the class having over 600 cubic inches displacement will be of more than passing interest in relation to which a remark or two may not be out of place.



HANSHUE IN APPERSON JACKRABBIT COAXING THE FIELD TO COME ON

SUMMARIES OF RESULTS

Friday, April 8—One-mile trial, Benz (Oldfield), 36.22, new American track record.

One-mile trial, amateur, Fiat (Bragg), 37.56.

Ten-mile trial, Simplex (Robertson), 6.31.37, new American track record.

Two-mile trial, Darracq (Kerscher), 1.18.29, new American track record.

Five-mile trial, Fiat (De Palma), 3.15.62, new American track record.

Ten-mile, Class C, 451-600 cubic inches piston displacement, Knox (Oldfield) won, Apperson (Hanshue) second, Isotta (Marquis) third. Time, 7.49 2-5.

Ten-mile chassis, 161-300 cubic inches piston displacement, Cole (Endicott) won, Buick (Nikrent) second, Firestone (Linthwaite) third. Time, 9.03.25.

Five-mile, free-for-all, Class D, Fiat (De Palma) won, Simplex (Robertson) second, Darracq (Kerscher) third. Time, 3.16.3.

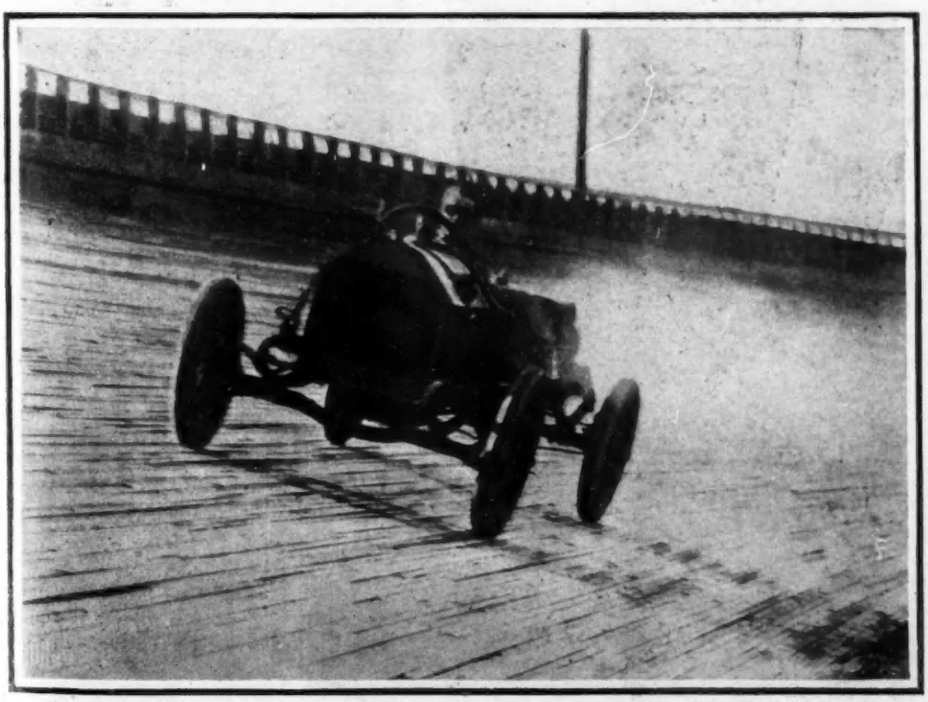
Ten-mile, 230-300 cubic inches piston displacement, Marmon (Harroun) won, Dorris (Siefert) second, Corbin (Livingston) third. Time, 1.25.22.

Saturday, April 9—Five-mile, Class C, 451-600 displacement, Knox (Oldfield) won, Apperson (Hanshue) second, Isotta (Marquis) third. Time, 3.52.20.

Ten-mile, free-for-all, Simplex (Robertson) won, Fiat (Bragg) second. Time, 6.35.6.

Fifty-mile, stock chassis, 161-230 displacement, Cole (Endicott) won, Buick (Nikrent) second, Warren-Detroit (Miller) third. Time, 43.49.69 (National Speedway record).

Ten-mile, stock chassis, handicap, Ford (Hampton) 3.10, won, Stoddard-Dayton (Livingston) 25, second, Knox (Oldfield) scratch, third. Time, 10.10.1.



COLE "30," ENDICOTT DRIVING, IN A RECORD PERFORMANCE ENDING EASY

Sunday, April 10—Fifteen-mile, stock chassis Class C, 160 displacement, Fiat (De Palma) won, Isotta (Marquis) second, Hupmobile (Kelly) third. Time, 17.07.81.

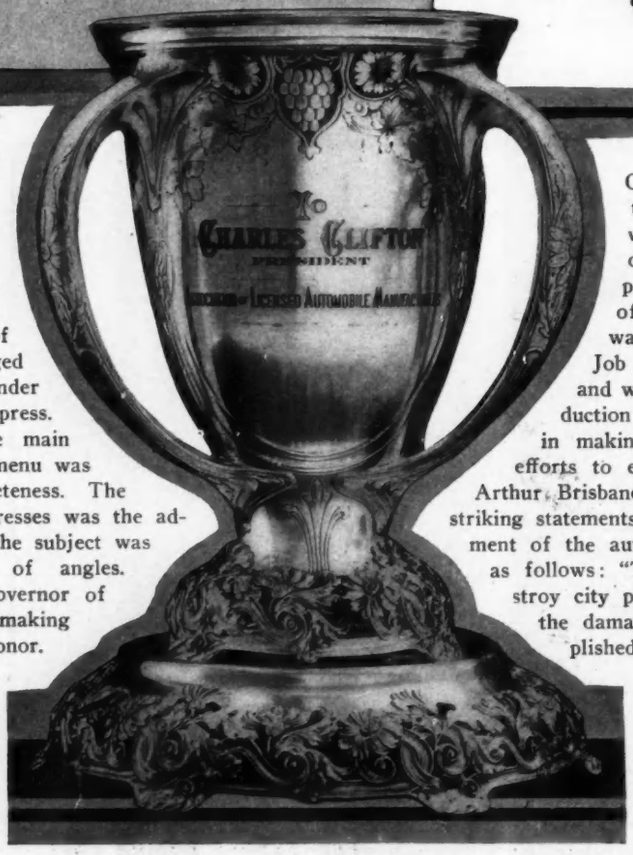
Five-mile, Chanslor and Lyon handicap, Palmer-Singer (Lescault) one minute, won, Stoddard-Dayton (Livingston) 35 seconds, second, Isotta (Marquis) one minute, third. Time, 3.23.16.

Five-mile, 231-300 class, Marmon (Harroun) won, Dorris (Siefert) second. Time, 3.55.97.

Fifty-mile, Venice sweepstakes, 451-600 class, Isotta (Marquis) won, Stoddard-Dayton (Livingston), second. Time, 39.20.69 (National Speedway record).

Five-mile handicap, Simplex (Robertson) scratch, won, Palmer-Singer (Lescault), 50 seconds, second, Stoddard-Dayton (Livingston), 30 seconds, third. Time, 3.29.28.

Five-mile, free-for-all, Fiat (Bragg) won, Simplex (Robertson) second, Darracq (Kerscher) third. Time, 3.15.89 (American record).



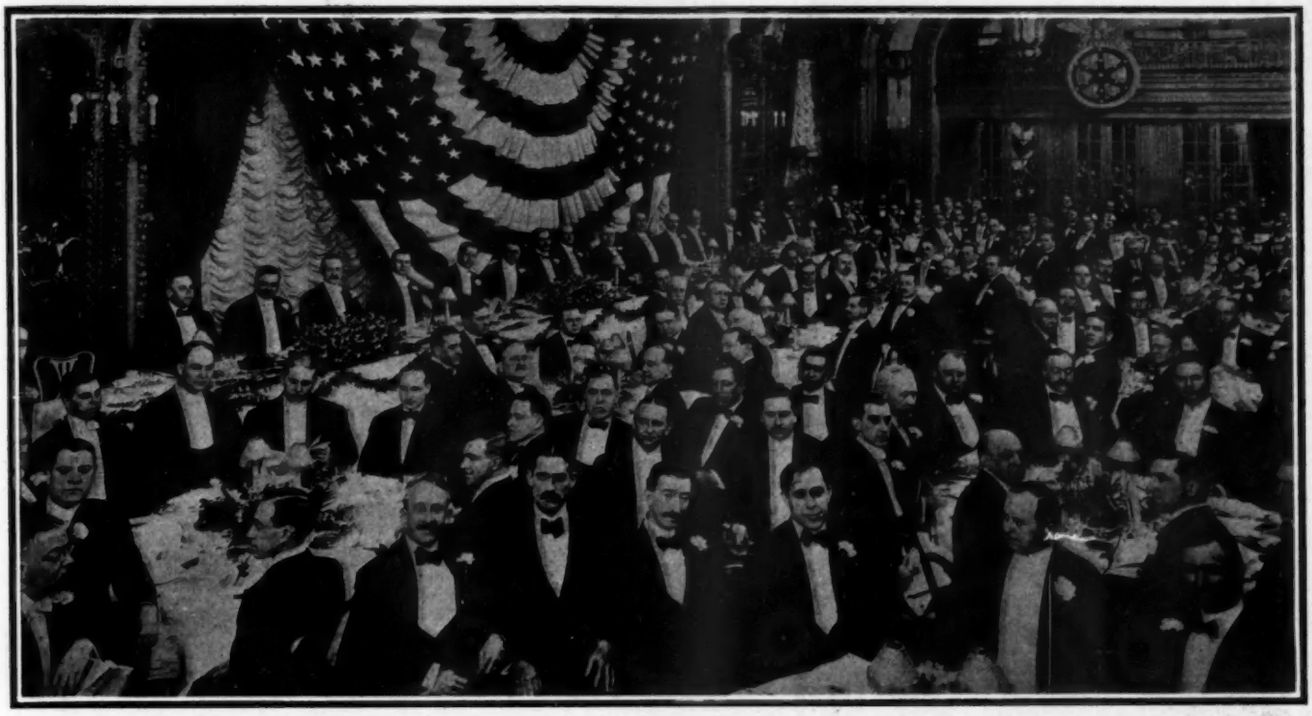
FELLOWSHIP was the keynote pervading the harmony that surrounded the first annual banquet of the Association of Licensed Automobile Manufacturers at the Hotel Astor on the evening of April 7. The attendance included about 150 and was composed of representatives of practically all the companies engaged in the making of the motor car under the Selden patents as well as the press.

The function was held in the main dining-room of the hotel and the menu was of particular choiceness and completeness. The fundamental motive in all the addresses was the advancement of the automobile and the subject was treated from a great variety of angles.

The Hon. Fred M. Warner, Governor of Michigan, the leading State in the making of motor cars, was the guest of honor. His address was devoted in large measure to tracing the influence of the automobile as an actual factor in modern development, with particular reference to its importance to the State of Michigan as an automobile center. Governor Warner prophesied that the Federal Government would cooperate with the individual States at no distant period in advancing the cause of good roads in a practical way to obtain results.

Job Hedges acted as toastmaster and was at his wittiest in his introduction of the various speakers and in making pat comments upon their efforts to entertain and explain.

Arthur Brisbane, editor, made a number of striking statements with regard to the development of the automobile. One of these was as follows: "The automobile does not destroy city pavements. The vast bulk of the damage in this respect is accomplished by the caulks with which the shoes of horses are armed. In the day when the horse shall be no more, I venture to prophesy that the saving in one big city in the matter of paving and repairs in one year will reach a



Scene in the Banquet Hall of Hotel Astor Upon the Occasion of the First Annual A. L. A. M. Banquet

figure that will be of sufficient size to cover the purchase of all the automobiles made in the country during that year."

Other speakers were Joseph E. G. Ryan, of Chicago, and William H. Edwards, Commissioner of Street Cleaning of New York.

The feature of the affair was the incident attending the presentation of a loving cup to Colonel Clifton and a Steinway Baby Grand piano to Mrs. Clifton, on behalf of the association.

At the appropriate period of the speaking, Colonel Pope arose and said that he had a duty to perform that was a real pleasure. He pointed out that such labor as had been given freely by Colonel Clifton in the interests of the association could not be bought with money.

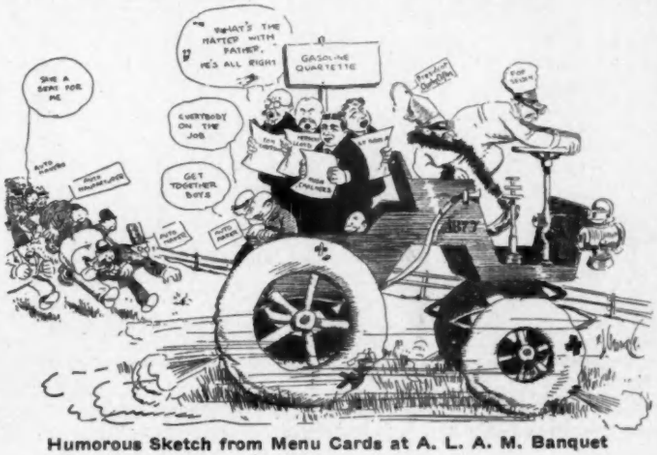
In accepting the cup, the president said that the basis of presentation would have to be altered before he would be easy in his mind about receiving it. He said that whatever success he had achieved as head of the organization was due to the fact that he had been accorded efficient support by the other officers and members of the association and that credit was due to them, even more than to himself. He made an earnest plea for continued co-operation and said that the only basis upon which he felt justified in accepting the cup was that it should be regarded as a rallying point for the forces of the association.

As he was about to resume his seat amid a volley of applause, Mr. Hedges turned toward Colonel Clifton and, when quiet had been restored, said that every member of the association knew how much valuable time had been given by Colonel Clifton to the association's work. That was in the past and could not be recalled.

But during all that time in which Colonel Clifton labored to build up the motor industry he almost forgot that he had a home. He could not forget his helpmeet and the partner of his joys and sorrows, but if had not been for the free service he gave the association, he undoubtedly would have spent more time in her company. Therefore, while the success of the association was sufficient reward in itself for Colonel Clifton, the association thought this a good time to make some sort of amends to Mrs. Clifton for the loss of her husband's company.

R. H. Johnston, of the White Company, composed some amusing parodies that met with much applause.

The full list of those who attended the banquet is as follows: C. B. Ames, John E. Baker, F. A. Barker, J. B. Bartholomew, A. G. Batchelder, Leigh Best, Samuel R. Betts, W. R. Blodgett, Preston H. Breed, Arthur Brisbane, Benjamin Briscoe, Frank Briscoe, Geo. H. Brown, M. J. Budlong, H. P. Burchell, Geo. H. Buzby, Henry Caldwell, Hugh Chalmers, Julian Chase, Coker F. Clarkson, Charles Clifton, H. E. Coffin, Lee Counselman, James G. Cowling, H. F. Cuntz, Duncan Curry, S. T. Davis, Jr., Horace De Lisser, H. F. Donaldson, F. D. Dorman, M. L. Downs, Geo. J. Dunham, Calvin H. Dunlap, W. C. Durant, J. Frank Duryea, Arthur N. Dutton, Hayden Eames, William H. Edwards, C. A. Emise, Hermann G. Farr, T. J. Fay, Frederick P. Fish, Edwin A. Fitts, Harry Fosdick, Geo. G. Foster, Lewis H. Freedman, W. N. Freeman, C. W. Fuller, R. D. Garden, C. J. Giegerich, J. W. Gilson, Charles Glover, Morris A. Hall, C. C. Hanch, L. P. Hardy, W. H. Harrison, M. S. Hart, Elwood Haynes, E. W. Headington, Job E. Hedges, Thomas Henderson, Edward R. Hewitt, C. C. Hildebrand, William H. Horner, Russell Huff, H. L. Humphries, Wm. R. Innis, R. B. Jackson, R. H. Johnston, H. B. Joy, James Joyce, F. M. Kirby, L. H. Kittredge, N. Lazarnick, Frank C. Lewin, Herbert Lloyd, V. A. Longaker, Henry A. Lozier, David S. Ludlum, G. G. Luthy, C. J. McIntosh, Alvan Macauley, J. M. Mack, Steven S. Manes, C. W. Matheson, F. F. Matheson, Walter C. Marmon, W. H. Marshall, J. S. Marvin, J. D. Maxwell, A. N. Mayo, W. S. M. Mead, William E. Metzger, F. L. Mitchell, Guy E. Mitchell, C. J. Moore, S. H. Mora, W. J. Morgan, W. G. Morse, A. C. Newby, M. H. Newton, H. W. Nuckols, Thomas C. O'Connor, R. E. Olds, R. M. Owen, Carl H. Page, I. H. Page, A. P. Palmer, E. F. Peer, John F. Plummer, Albert L. Pope, Harold L. Pope, George Pope, C. F. Pratt, Howard E. Raymond, William A. Redding, Alfred Reeves, Samuel Regar, A. L. Riker, A. W. Robinson, Frank W. Roche, E. H. Rounds, E. F. Russell, R. H. Salmons, P. D. Schenck, Kenneth B. Schley, E. E. Schwartzkopf, George B. Selden, Albert E. Smith, H. O. Smith, F. B. Stearns, Oscar Stevenson, W. S. Stevenson, Walter Stewart, C. G. Stoddard, Geo. H. Strout, Walter Sullivan, William M. Sweet, H. M. Swetland, E. L. Thomas, E. R. Thomas, Thomas H. Thomas, Carll Tucker, W. H. Van Dervoort, R. B. Van Dyke, S. D. Waldon, C. E. Walker, W. C. Walker, Walter Wardrop, Hon. Fred M. Warner, J. W. Wellington, O. H. L. Wernicke, J. C. Wetmore, William T. White, Walter C. White, Windsor T. White, Alexander Winton.



Humorous Sketch from Menu Cards at A. L. A. M. Banquet

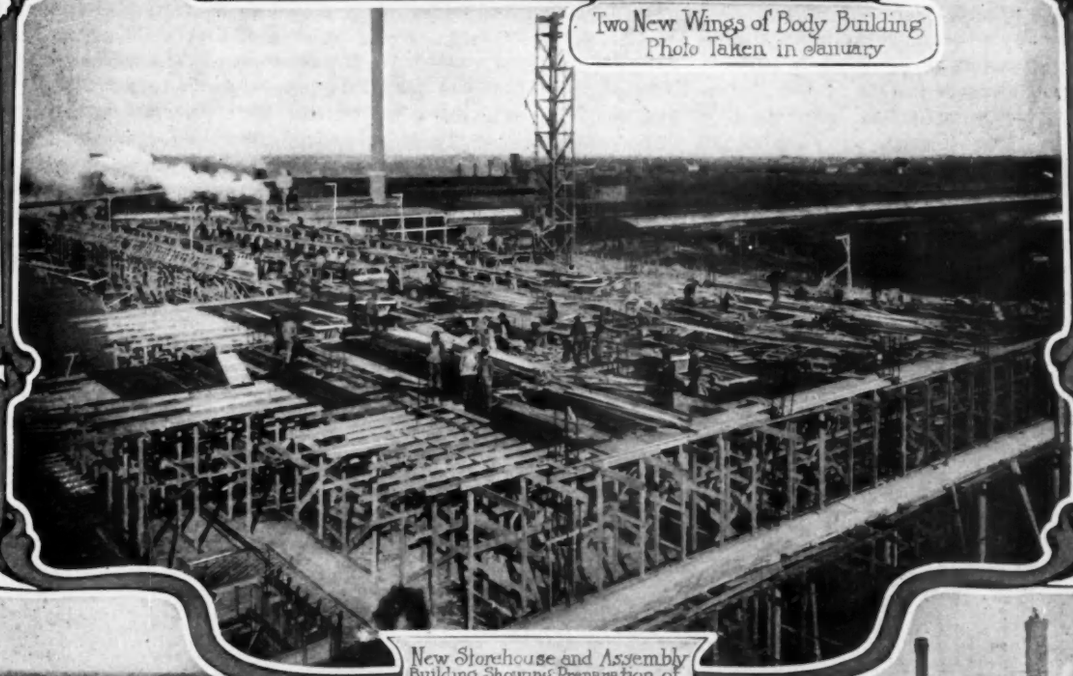
Little daughter of Mr. and Mrs. W. C. Johnson, assistant general manager of The Waverley Company. Mrs. W. C. Johnson and Mrs. W. F. Taylor graced the seat of the Waverley Electric, enjoying the privilege of chaperons to the "Belle," who appeared to appreciate the situation.

RECENT PIERCE-ARROW FACTORY ADDITIONS.

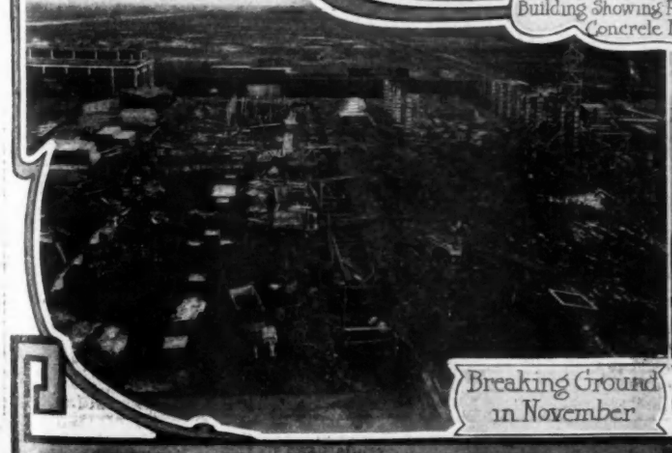
Even Winter Weather Couldn't Stop Progress

View of one Addition to Body Building

Two New Wings of Body Building Photo Taken in January

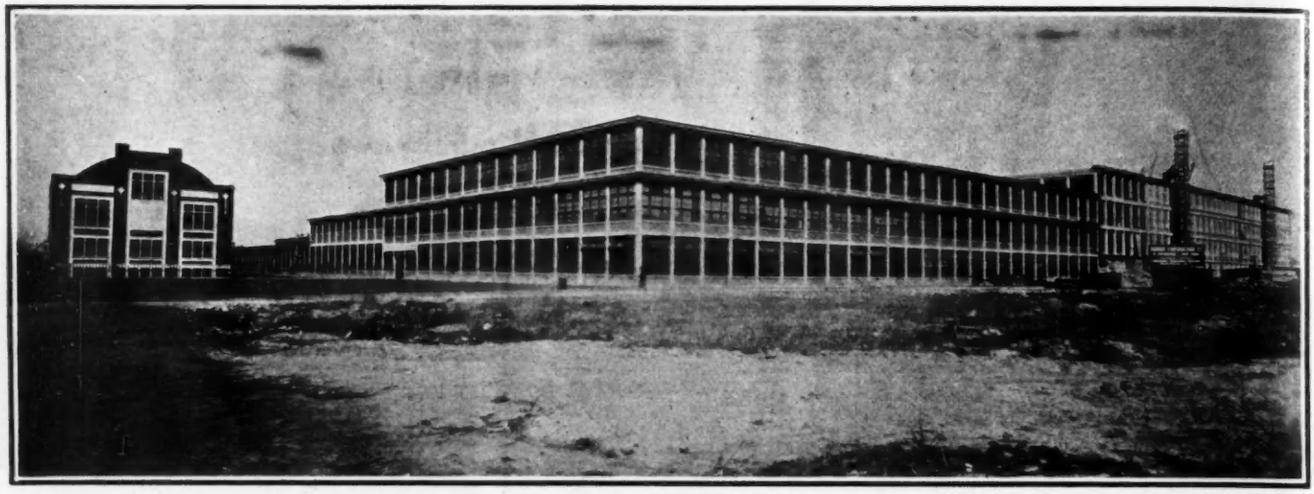


New Storehouse and Assembly Building Showing Preparation of Concrete Forms



Breaking Ground in November

All Spare Room Served as Storage



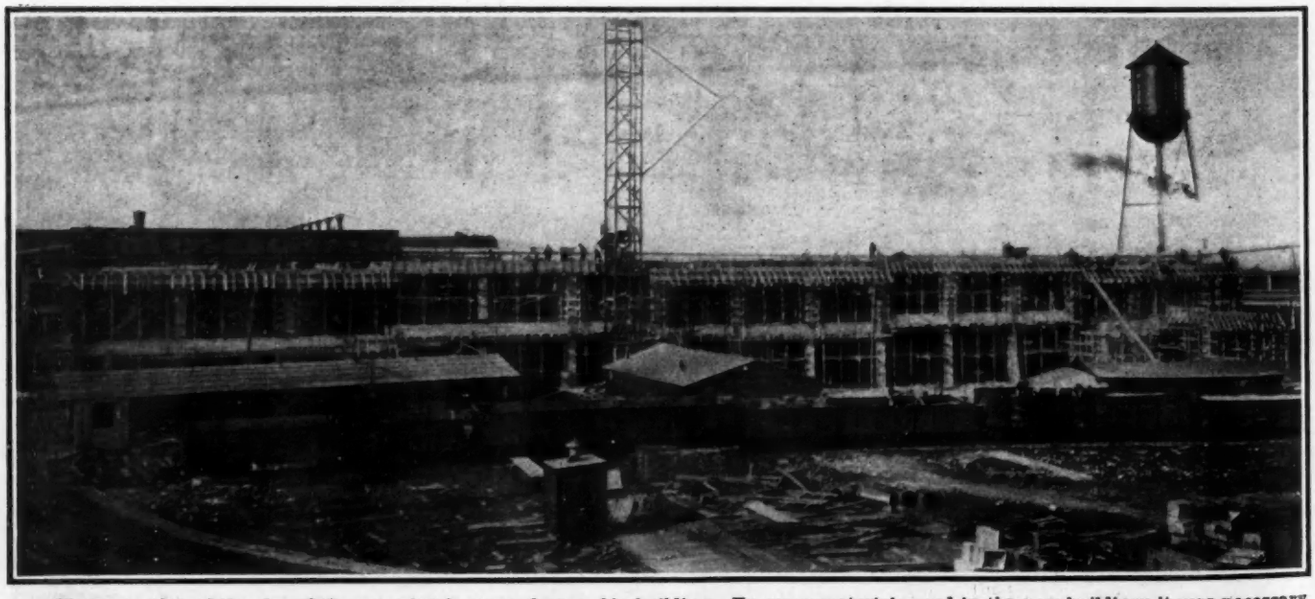
Panorama view of the Pierce-Arrow plant along Great Arrow avenue. The three-story structure in the foreground is one wing of the original body building, while at the right may be seen one of the four-story 350 by 60 foot wings just added to it. At the left is shown one end of the Administration building.

ENLARGEMENTS of the largest automobile factory in Buffalo, some of them practically accomplished, others under way or planned for the immediate future, and in conjunction herewith a final, long-expected announcement to the effect that the same factory will presently manufacture a heavy-load, high-powered automobile truck, constitute steps in the onward march of the automobile industry which must attract national and international attention by reason of their intrinsic interest.

The factory in question is that of the Pierce-Arrow Motor Car Company, and the public interest attaching to the enlargements of its activities, as referred to, lies rather in the promise of a greater output of a favorite car of high grade than in the encouragement which the company's success must afford for all automobile manufacturers who may wish to adopt its methods, highly deliberate as they have been, yet leading safely and quickly to large production and an eminent position in the industrial world.

The truck which the Pierce-Arrow company will manufacture in one of the new buildings to be erected for this purpose has been on trial for about two years. It was loaned to a tire manufacturing company for five months with a view to giving it the hardest possible usage; namely, such as the tire company found necessary in order to test its own output of truck tires to destination, and, even during its earliest experimental days, the new model truck bore itself as a true prime mover of heavy loads over roads of all descriptions, never requiring outside assistance or roadside repairs. After having observed the progress of truck construction all over the world for a number of years, without feeling quite sure that full value for commercial work was produced anywhere, or that the manufacture of trucks could be undertaken properly in a plant intended for the production of pleasure vehicles, the designers of the experimental Pierce-Arrow truck had the satisfaction, when the time finally seemed ripe for active steps, to find that their observations had rounded themselves into a full-fledged conception of the type of truck most needed and most economically useful, but also most difficult to produce for the variable American road conditions; the truck of a load and power rating far exceeding that of most commercial vehicles in successful use.

The contemplated production of this heavy truck is only in small part responsible for the new enlargements of the Pierce-Arrow plant. The floor space, the mechanical equipment and the number of employees are being increased in all departments, and the fact that this expansion can take place without interfering in the least with the prosecution of the daily routine of work brings in an element of absorbing interest far beyond the automobile industry. The factory, as it was planned four years ago and as it became ready for occupancy in 1907, was laid out with just this



Giving an idea of the size of the new storehouse and assembly building. To carry materials used in the new buildings it was necessary to run two lines of railroad track into the Pierce-Arrow yards. One, with a line of cars on it is shown, the other being in the extreme rear of the site or foreground of the photograph.

The new Pierce-Arrow plant from the rear. On the left are the two almost completed wings of the new body building. The small building, just inside of the fence, is that for motor testing which is to be enlarged. The structure on which work is shown to be in progress is the nickel-plating building, while to the right is the new storehouse and unit assembly building.

possibility of expansion in view and yet without any sacrifice of economic advantage. But it was thought at the time that the facilities provided would be sufficient for a number of years.

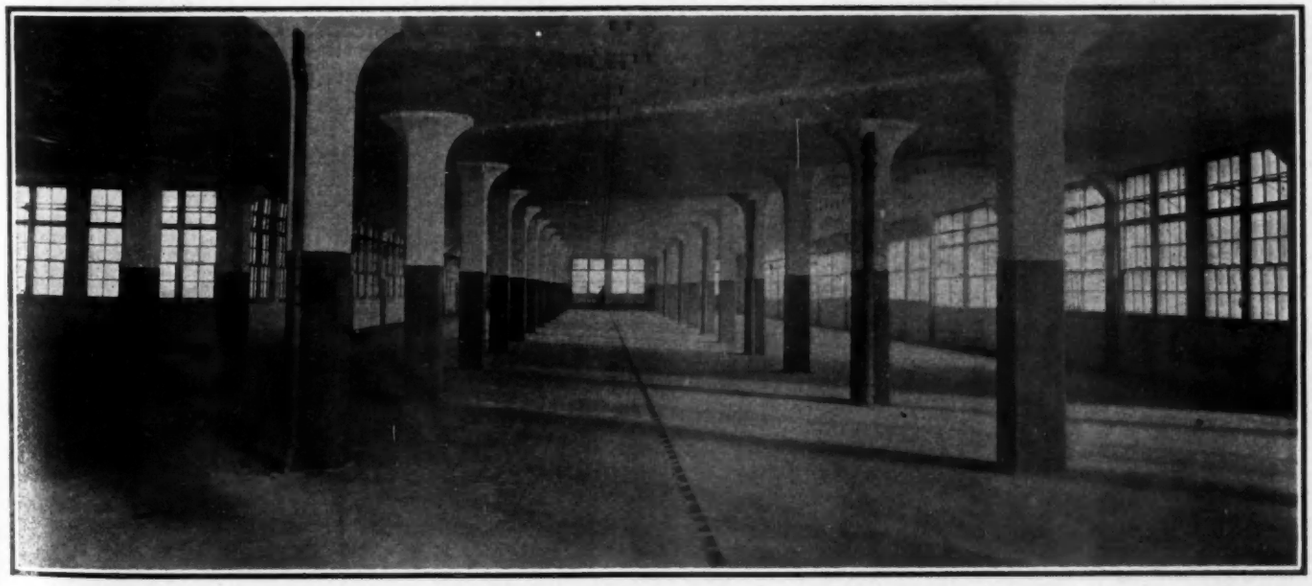
A brief retrospect will give the best idea of the foresight employed and of the value which will flow from it when factory managers from other cities and countries take note of the manner in which the plant has been made susceptible of expansion without any piecemeal addition of incongruous features or buildings.

The Pierce-Arrow plant of 1907 was one of the first great factories in the world built exclusively for the production of the highest grade of automobiles on a large scale and fitted no less for the welfare of employees than for solution of all problems in manufacture and independent research along lines of improvement. The ground plans bore evidence of the importance attached to economical handling of stock and parts. From the freight and express cars, through the inspection department all materials passed with strict reference to the order of the successive processes which they must undergo, before finally reaching the department of assembling. Here improved methods for saving labor and space were well instanced in two traveling cranes, which carried not only whole chassis, but also motors and other units, so that wide aisles for wheeled trucks could be entirely dispensed with. Saw-tooth roofs were used wherever possible and in the higher buildings the combination of steel and glass secured an abundance of daylight, rendering artificial lighting almost superfluous on even the darkest days. This was part and parcel of those provisions for the comfort of employees in which enlightened self-interest meets the demands of humanity, with the understanding that only ideal working conditions will produce the best workmanship. Other features of this nature were the hygienic kitchen, bakery, meat dressing plant, ice plant and laundry and the great dining hall seating 800 persons, as well as the most improved system of individual lockers, bicycle racks and wash bowls with towels and soap.

When this factory was taken into use, Buffalo immediately took great civic pride in it. It became one of the industrial show places which all visitors to the city must see. Men from England, France, Germany and Italy came to see for themselves how structural and production problems had been met. The machinery installed in this plant was all new and designed to give the highest efficiency in the handling of the work and with special reference to the machining of the grades of steel required for select automobile construction. Additions to this equipment have been made since, as machine tools have improved.

For little more than two years this plant has been generally considered a model of modernity and thoroughness, and the enlargements now in progress are bringing out its adaptability.

(*Continued on page* 735)



Ground floor of the new storehouse and unit assembly building. This floor is now being used for the reception of raw material. The second floor of this building, exactly similar in aspect, is used for finished stock and the third and fourth for the assembly of units such as motors, transmissions, rear axles, carbureters, steering gears, pumps and clutches.

Advanced Methods Obtain in the National Plant

By THOS. J. FAY

QUALITY is induced into an automobile in proportion as the materials are suited to the purpose, the design is wise, and the workmanship is excellent. Let it be taken for granted that the materials are suitable, and that the design is that which will survive, and the field will then be free, leaving it open to the discussion of the remaining important question—the methods employed in the manufacturing plant.

It might appear that the remaining main situation allowing that it involves factory equipment is possible of solution on the basis of an abstract problem. A moment's thought must certainly lead to a sound basis for contending that to simply purchase stock machine tools, and place them in orderly array, in a well-designed building, let it be admitted, would hardly do; the tools would not of necessity be suited to the occasion.

An ordinary lathe, while it may be regarded as capable of doing general work at a convenient rate of speed, is entirely too weak to stand up against alloy steel, particularly when the cutting tools are high tungsten product, and the speed of cutting is all the way from 60 to 100 feet per minute. Lathes as they were designed originally, and as they obtain under conventional conditions, are capable of machining cast iron at perhaps 20 feet per minute for the speed of cutting; they will do this work with excellent accuracy, but the tensile strength of cast iron is maximum at 30,000 pounds per square inch, whereas the tensile strength of many of the grades of steel used in automobile work reaches above 80,000 pounds per square inch, and 100,000 pounds tensility is not unusual. In the case of cast iron, the elongation is normal, whereas in the better grades of alloy steel it is not far from 25 per cent. in 2 inches of a ½-inch test proof, and too, account must be taken of the elastic limit of alloy steel. In some of the product this factor reaches as high as 80,000 pounds per square inch, whereas the elastic limit of cast iron is very low.

Obviously, lathes, or in fact any generic type of tool, which may have been designed to handle cast iron, or even the mild grades of machinery steel, as formerly utilized in structural work, are bound to fall below a fitting requirement when high-class automobiles are to be manufactured. Accuracy, while it is necessary in general machinery, is an absolute requirement in automobiles. The old idea was that accuracy depended upon the skill of the man, and it does to a very considerable extent, when the man takes into account the weakness of the tool and by skill limits output to that which will check with the inherent defect in the tools placed at his disposal.

In the early days of the automobile, when ordinary machine tools were all that could be had, men were paid to limit output, and skill on the part of the men was an absolute necessity, because the limit they placed upon the output was that which would induce a measure of accuracy in view of the inherent weakness of the machine tools.

No wise automobile builder will care to go back to the days when skilled machinists were paid to limit the work in proportion to lack of ability of the tools used. No doubt this is an odd way of putting it, but it is in exact accord with the facts as they existed. Automobile work then reflected excess cost and poor workmanship, taking it as a whole. Makers of automobiles were compelled to exact special and more rigid machine tools for the purpose, and in the absence of regular stock products to be had on this basis it became necessary to go in for special machine tools and they, in all probability, considering the respective shops, were designed with a particular eye to the hardness and tenacity of the metal used in the construction of the automobiles.

In the National plant at Indianapolis this phase of the situation was taken cognizance of almost at the start, and the plant equipment is made up very largely of special machine tools, each one designed to do the very work required, and a system of jigs, fixtures, gauges, and instruments of precision is so designed and employed that the antonym of the skill which was formerly sought for on the part of machinists is utilized.

With heavy and well-designed machine tools, fitted with fixtures and jigs, appropriate to the undertakings, skill of the operators is for the purpose of producing the work quickly, a high rate of speed being possible; accuracy is a direct result of the process so that the skill of the workman is not utilized in the act of apologizing for the weakness of the tool.

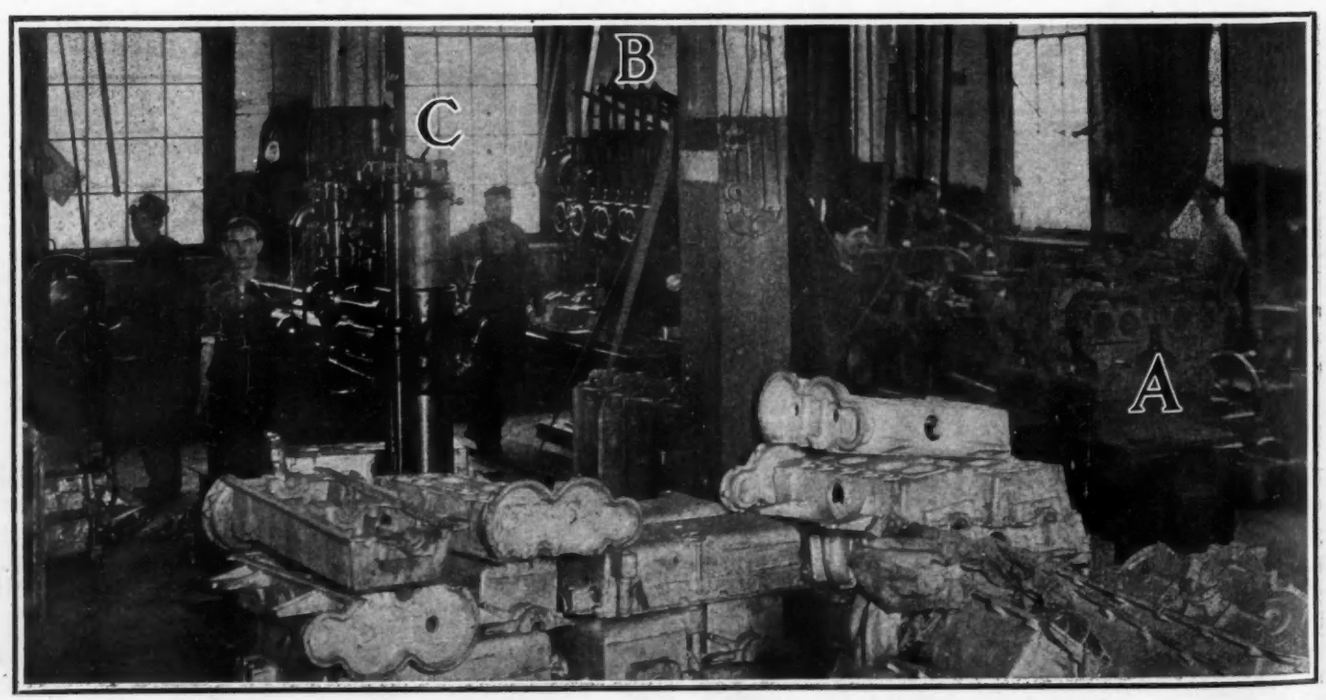
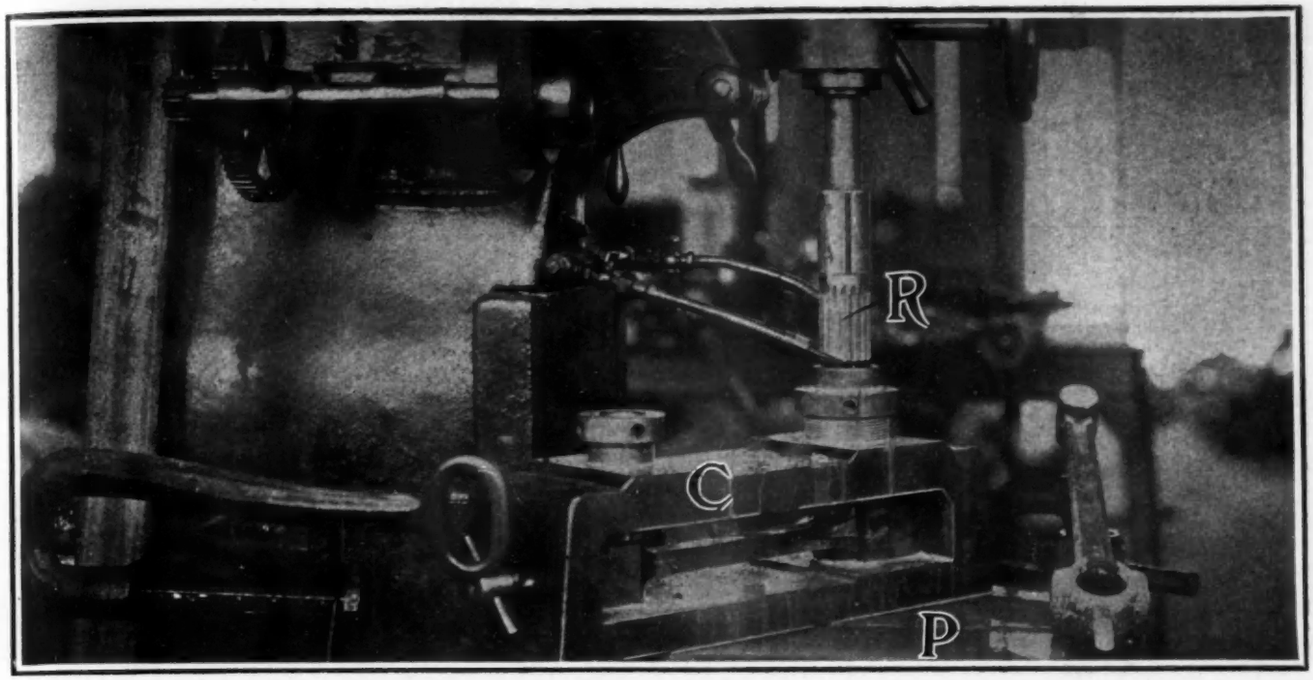


Fig. 1—General view of machine shop in National Motor Vehicle Company, showing cylinder boring machines working on gangs of engine cylinders. Crankcases are shown in the foreground



No. 2—Fixture used on vertical heavy milling tool to machine connecting rods. The fixture allows the machining of both ends by simply changing the cutter to the proper size

Fig. 1 shows a general view of one corner of the plant with a number of aluminum crankcases in the foreground, and some of the special machine tools in sight. A represents a large and well-designed cylinder boring machine, with a revolving platen on which a fixture is mounted, and the arrangement is such that four pairs of cylinders are in position for work to be done upon them at all times. This type of machine is available for either boring or grinding, and the workman is enabled to swing the platen around as fast as the cylinders are finished, and to replace the finished cylinders with cylinders to be machined as the occasion requires.

In this work the cylinders are rough machined at a high rate of speed, it being the object to remove metal as rapidly as possible, but the final operation, being that of grinding, assures accuracy to the desired limit, and in order to prevent the cylinders from warping in the grinding process, they are maintained at a constant temperature for the time. It is advantageous to rough machine the cylinders at a high rate of speed because the internal strains will be released as the direct result of high speed work, and since the grinding operations take place subsequently, the chances of deformation, due to the release of internal strains, are substantially eliminated.

Referring again to Fig. 1, B presents a multiple spindle tool which is fitted out to do rapid and accurate work on the aluminum crankcases which are of the character shown in the fore-

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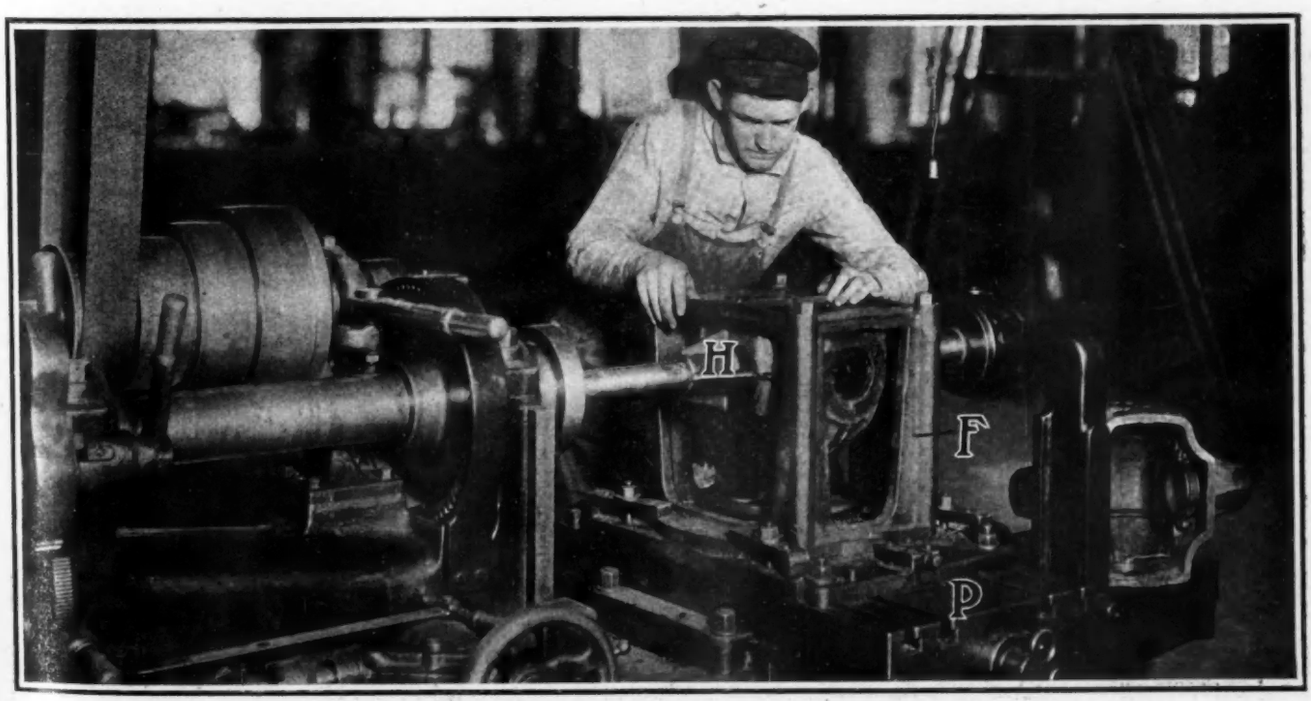
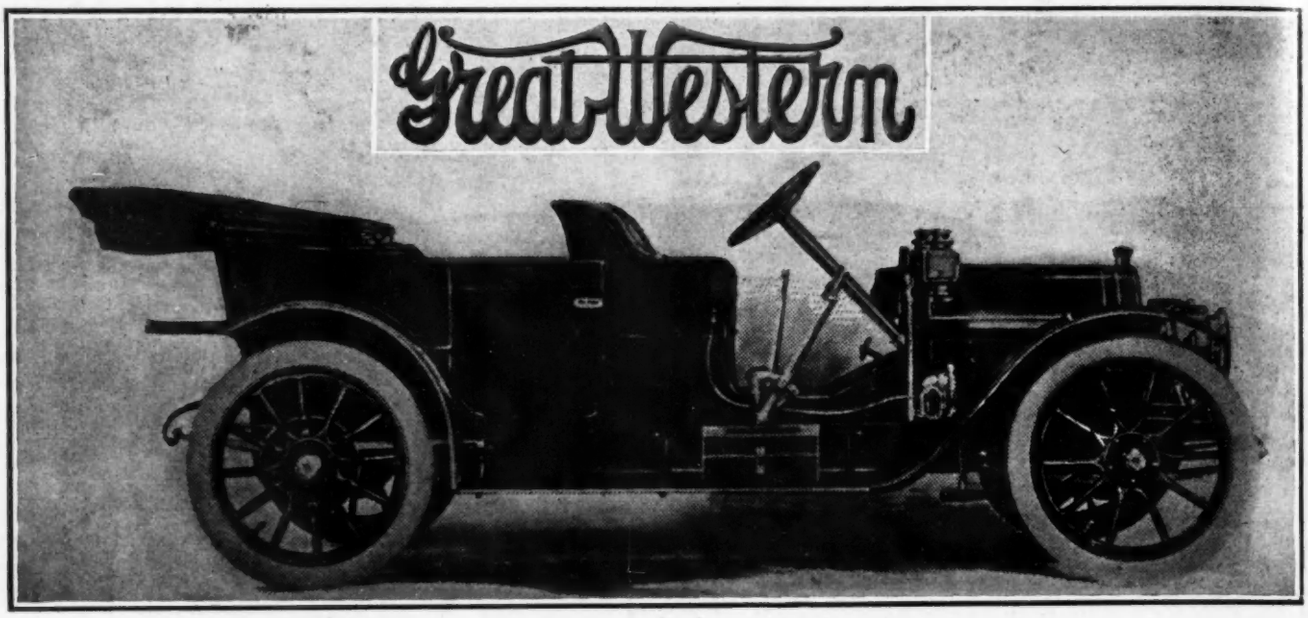


Fig. 3—Horizontal boring machine in National plant working on rear axle and differential housing, the work being held in a special fixture. A finished case is shown at the right

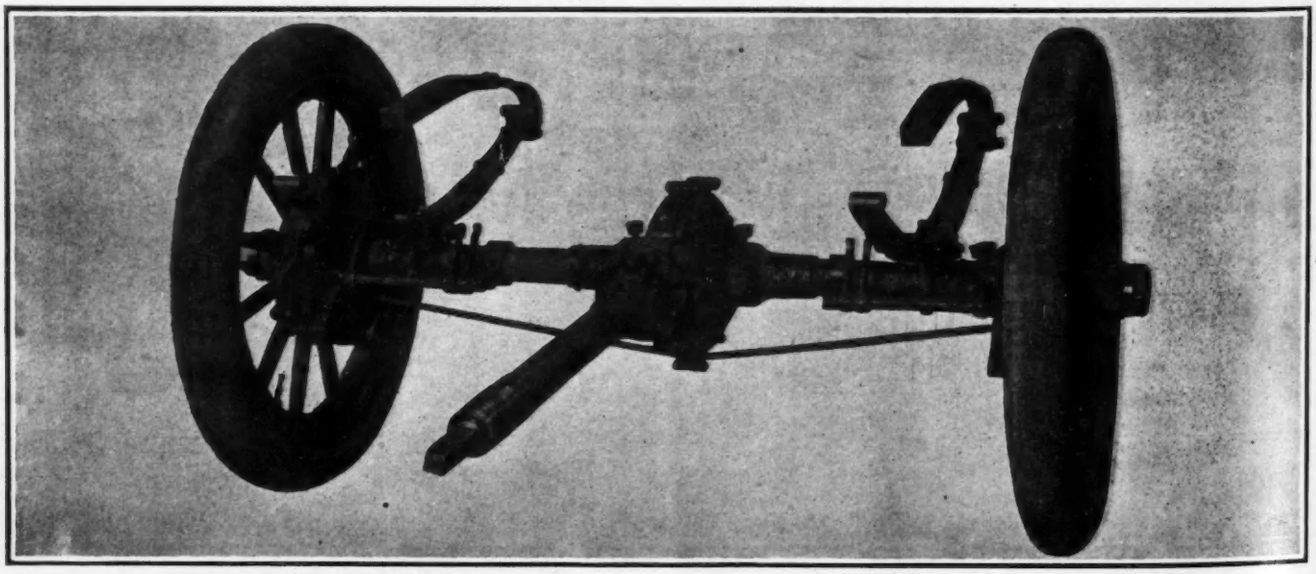


Great Western Thirty With Touring Body Is the Result of Many Years' Experience

FOR 1910 the Great Western Automobile Company, Peru, Ind., previously known as the Model Automobile Company, will continue to build a single type of touring car designated as the Great Western Thirty. This 1910 model has a 4 1-4 by 5-inch motor, with a formula rating of 28.9 horsepower.

Many new features are present in this model, among which are: The enclosing of the timing gears in an oil-tight case, the removal of the magneto from the intake side of the motor to the exhaust side so that the magneto and the water-pump are both operated from the same shaft, and the parts more symmetrically and conveniently placed. This year the fan is supported on an adjustable bracket on the front cylinder; the flywheel is marked for timing; a water-jacketed Schebler carbureter and Remy magneto are regular equipment; and improved water piping is employed in the cooling system. An improved transmission is also claimed for the new model, the gears being now made in the company's factory. The cone clutch is lined with raybestos, with springs underneath to insure easy engagement; and a novelty has been brought forth in the attachment of the pan which hangs under the motor, clutch and gearbox in that it operates on hinges so that it can be lowered by releasing the catches on one side when the car is being washed or adjustments are being made.

The motor is neat and simple in appearance and has a number of the most approved features characteristic of the best modern engineering practice. The four cylinders are cast separately with long spacious waterjackets, the inner walls are ground to the top of the head and the heads are machined to prevent the accumulation of carbon, connections are very direct and quite accessible, all moving parts are adjustable for wear, an absolute interchangeability of parts is claimed, and all outboard bearings not automatically lubricated by the oil circulation in the motor are provided with compression grease cups. The outside features of the motor are clearly shown on the next page. In this, the right side of the motor, the valve mechanisms, which are operated from a single camshaft within the crankcase, may be plainly seen. Note the accessible location of the spark plugs and priming cocks in the intake valve chambers, and the peculiar construction of the intake manifold. This type of manifold construction has been successfully employed by some of the most prominent motor manufacturers. The carbureter, as may



Rear Axle of Floating Type Showing Also Spring Suspension, Driving Shaft, and Wheels

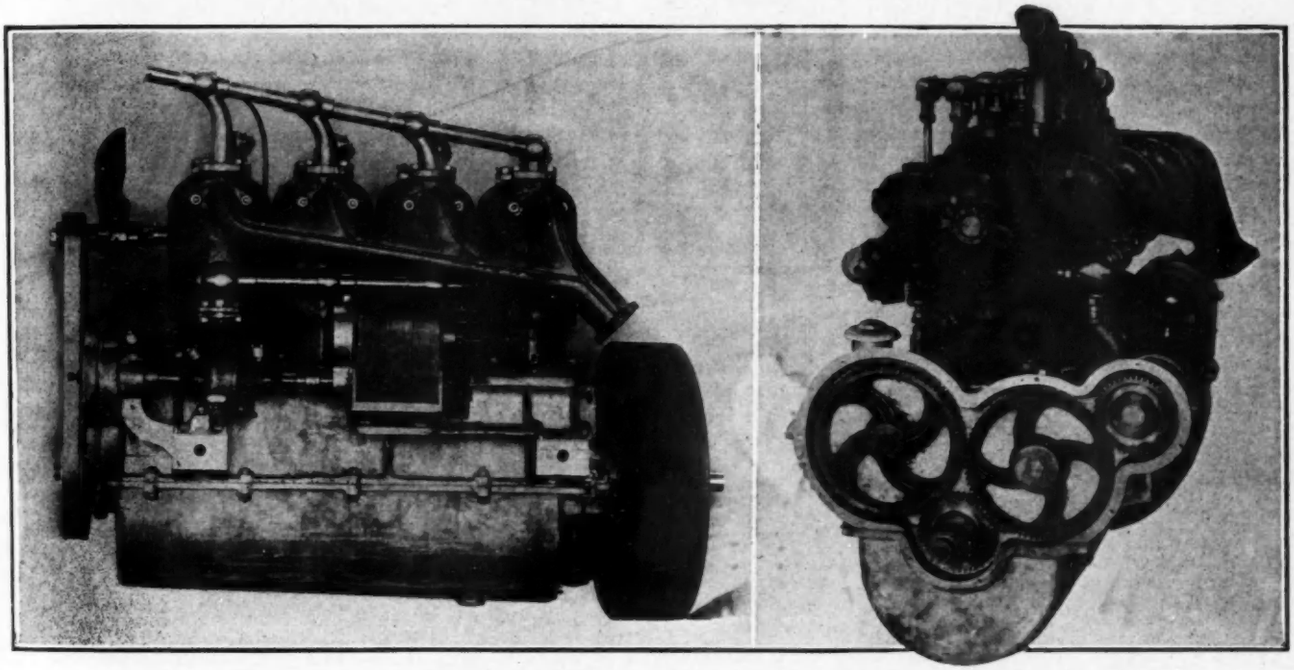
be seen, is also accessible, a feature which is greatly to be appreciated by the owner or repairman who has found it necessary on some cars to drop a most unwieldly pan, then try to make adjustments or disconnect a carbureter which is located in a most unapproachable position.

Two large hand-hole plates in the side of the crankcase are provided in order that the contents of the crankcase may be readily inspected; and a vent pipe relieves the crankcase compression. This vent pipe is so constructed that oil cannot possibly be thrown out and yet the compression is released. Between the end of the lower half of the crankcase and the flywheel may be seen the oil pump, which maintains the proper level in the upper portion of the lower half of the case. It is a gear pump, gear-driven off the end of the camshaft through the vertical shaft; and draws the oil from the lowermost portion of the oil reservoir, and forces it into the crankcase proper through the connection.

Turning to the left side of the motor, special attention is called to the construction of the exhaust manifold. It is not only graceful in appearance and easy to remove, but its chief feature is that it has no sharp bends and enlarges gradually toward the rear end so that the gases are so well taken care of that back pressure is reduced to a minimum. The direct connections and rigid supports of the magneto and waterpump are shown in this illustration; the magneto resting on a bracket cast integral with the case, and the water pump bolted to a boss on the leg of the engine. The water, entering the pump at the inlet, passes up into the waterjackets of the cylinders through the manifold, and after circulating around the cylinder walls, valve and explosion chambers, issues from the top of the cylinders and passes to the radiator through the manifold. Each bearing of the shaft which drives the pump and magneto is provided with a grease cup. The metal timing gears are enclosed and run in a bath of oil. The simplicity of the adjustable fan support is also shown in this illustration. Loosening the pinching screw permits the rocking up or down of the bracket to secure the desired tension.

The exhaust valves of this motor are located in the center of the cylinder head, and operated through pushrods and rocker-arms. They are contained in cages and may be readily removed for grinding. The intake valves are contained in outboard chambers characteristic of an L type motor, and operated in a conventional manner from lifters below. All pushrods are adjustable and the entire set may be easily removed for inspection by simply removing the four yokes through which they are clamped down to the crankcase.

All pistons are ground to very accurate measurements and are ribbed for the purpose of reducing weight without decreasing their strength; and to further strengthen their construction and reduce expansion, their heads are convexed. Each piston is annealed to eliminate the unequal strain of the metal when subjected to heat, and then ground to measurement. Four eccentric expansion rings are fitted to each piston and a snap ring is employed to hold the wristpin in place. Oil grooves are also cut into the pistons so that the oil may be uniformly distributed to the cylinder walls, and every piston is machined on the inside to a given weight in order that a replacement may be made without throwing the motor out of balance, should a replacement be found necessary. The connection rods are of drop-forged steel and of I-beam section, with die-cast nickel babbitt bearings at the piston end and split bushings of the same material at the crankpin end. The crankshaft is a solid forging with a flange forged integral with it, to which the flywheel is bolted, and is supported in five die-cast nickel babbitt bearings with a bearing surface of reasonable area. The camshaft, which is supported on three main bearings, is a solid forging with all cams forged integral; and it is so arranged that by loosening the nuts on two of the three bearings the camshaft can be withdrawn. The crankcase is of aluminum alloy, and the motor is so designed that the working stresses of the cylinders do not fall upon the crankcase but are taken up entirely by the steel studs that hold the cylinders and support the crankshaft bearing caps as well.



Exhaust and Ignition Side of Engine, Also End View Showing Timing Gears, Valve Rockers, and Manifold

Transmission from the motor to the rear wheels of this car is conventional in every respect. The clutch is of the regular cone type faced with raybestos, a composition of asbestos and fabric which has been widely adapted as an efficient brake-lining material, and springs have been fitted beneath this clutch facing to facilitate smooth engagement. The change speed arrangement is a sliding gear transmission of the selective type giving three forward speeds and reverse. A locking device is fitted to this mechanism to prevent the gears from sliding out of engagement and it is impossible to bring two sets of gears into mesh at the same time. Drive to the rear axle is by means of a shaft, enclosed in a tubular housing which serves as a torsion tube. The rear axle is of the semi-floating type and the front axle is one-piece nickel steel forging.

Pointers In Repair Work—Referring Specifically to Valves

LAST week in the discussion of the repair of an automobile, it was pointed out, among other things, that the valve grinding process as it obtained through the life of the car had resulted in the valve seats being widened until it became a question as to whether or not tightness could be relied upon. Fig. 1 shows the relatively narrow bevel seats as they obtain in motors when they are new. In some makes of motors the distance across the face of the seat is limited to 3-16 of an inch, and very few motors will be found in which this distance will exceed 5-16 of an inch. Valve grinding has two unfortunate effects, one of which is the face of the seat is increased, and the second trouble is due to the dropping down of the valve to accommodate itself to the new seating, and the timing of the valve is therefore upset because the clearance distance as marked in Figs. 7 and 8 is decreased. This distance may be diminished so much that the valves will not be permitted to seat, in which event they will fail to serve their intended purpose.

Referring to Fig. 2, it will be observed that the seat of the valve is very wide indeed, and this is the condition which was found in the motor referred to above. In this particular motor, the cam wore faster than the amount of the grinding away of the valve seat, so that the clearance, as shown in Figs. 7 and 8, increased instead of decreasing. The result was equally bad, because the timing was upset in any case. It was decided that a good repair could not be realized without reducing the valve seat, and it was suggested that the method as shown in Fig. 3 might be employed to advantage.

Referring to Fig. 3, it will be observed that a wing cutter is inserted in a round hole in a boring bar and the boring bar is then passed through a valve cover opening of the cylinder, after which the guide as shown is screwed down tight in place of the regular cover. It will be necessary of course to slide the guide over the boring bar before the wing cutter is inserted in the hole unless it is found that the cutter can be slipped over from the other end. The length of the wing cutter must be less than the diameter of the valve cover hole, and a measurement must be taken which will permit the repairer to tap the cutter out so that the cutting edge will engage the face as shown by the radius of the dotted line, which is placed to indicate the amount of metal to be removed in the process of reducing the face of the valve seat.

The guide should be quite long, and should extend down in order to support the bar at a point as near the cutter as possible: the larger the bar the less will be the necessity of support. The bar may be driven in any desired way, and a vertical drill press would serve very well indeed. There are certain dangers attached to a process such as this, and Fig. 4 very clearly indicates one of them. It is a well-established fact and known to every foundryman, and those who have to do with cylinders when they are cast from gray iron, that shrink holes abound in the body of the metal wherever it is accumulated, sufficiently to make the rate of cooling lower than the rate in general for the whole casting. The part of the metal which cools off fastest will be the most solid, and it will draw metal from the portions which remain liquid in the process of solidifying. In this way shrink holes are formed and they are very likely to obtain in the metal adjacent to the valve seat unless the design is so contrived as to overcome this difficulty.

In any attempt to re-adjust the seat for the valve, especially if the process as shown in Fig. 3 is resorted to, it will be wise to examine the design and note if there are excesses of metal in the vicinity of the valve seat. If metal obtains there to a considerable extent, there is a good chance of uncovering pockets when the wind cutter engages the metal and takes away any considerable portion thereof. Fig. 5 shows a design which is practically free from trouble of this sort, in which it will be observed that the walls of the forts are not in the same plane as the metal out of which the valve seats are formed. The design has for its basis great uniformity of the thicknesses of the walls throughout, and a further object in thus proceeding is to make the wall thickness back of the valve seat such that water will tend to cool every portion of the seat equally. There are other good teachers to be observed in this design, as, for illustration, the valve stem is in a boss which is water-jacketed for nearly the entire distance, so that the heat which passes down the valve stem from the mushroom is tapped away to the adjacent water, through the stem guide formed out of the boss, which is integral with the metal of the cylinder proper.

It is claimed by some designers that a valve stem bushing is ill advised, on the ground that the conductivity of the joints which form between the bushing and the retaining wall is far below the same property in the absence of joints. The bushing, according to this method of reasoning, retards the transfer of heat, and the stems of the valves are then not in a position to tote away the heat which is picked up by the mushroom on the end of the stem, due to its contact at first hand with the flaming products of combustion.

It was observed in the motor which underwent repair, that

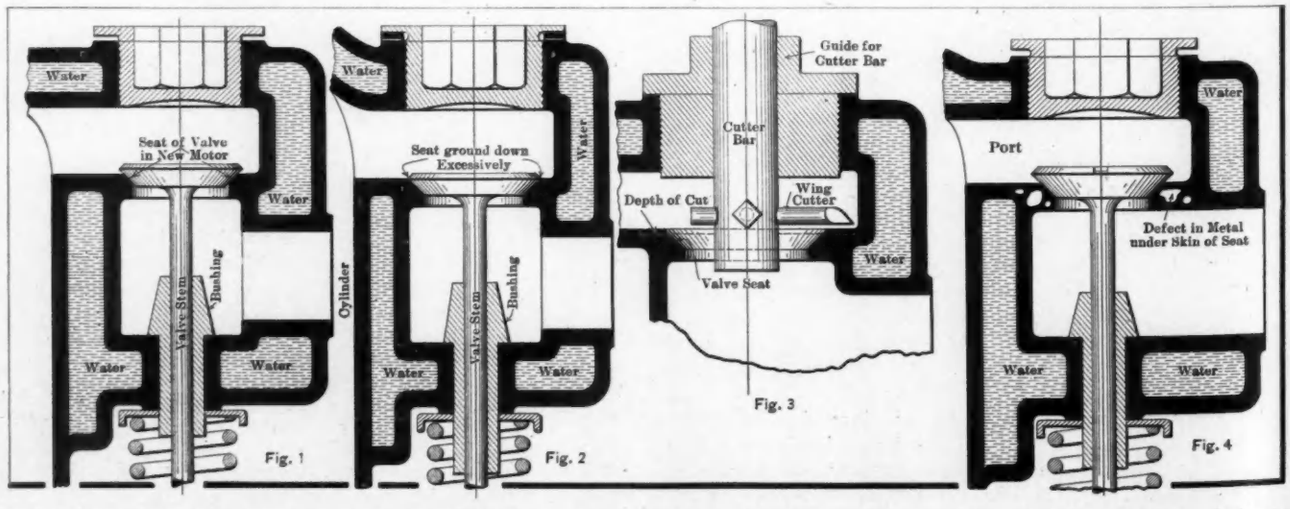


Fig. 1—Showing proper seat as found in new engines. Fig. 2—Condition to be avoided, valve ground down too far into seat. Fig. 3—Wing cutter and guide bar for cutting correct seat. Fig. 4—Unavoidable but troublesome defect in metal just at valve seat

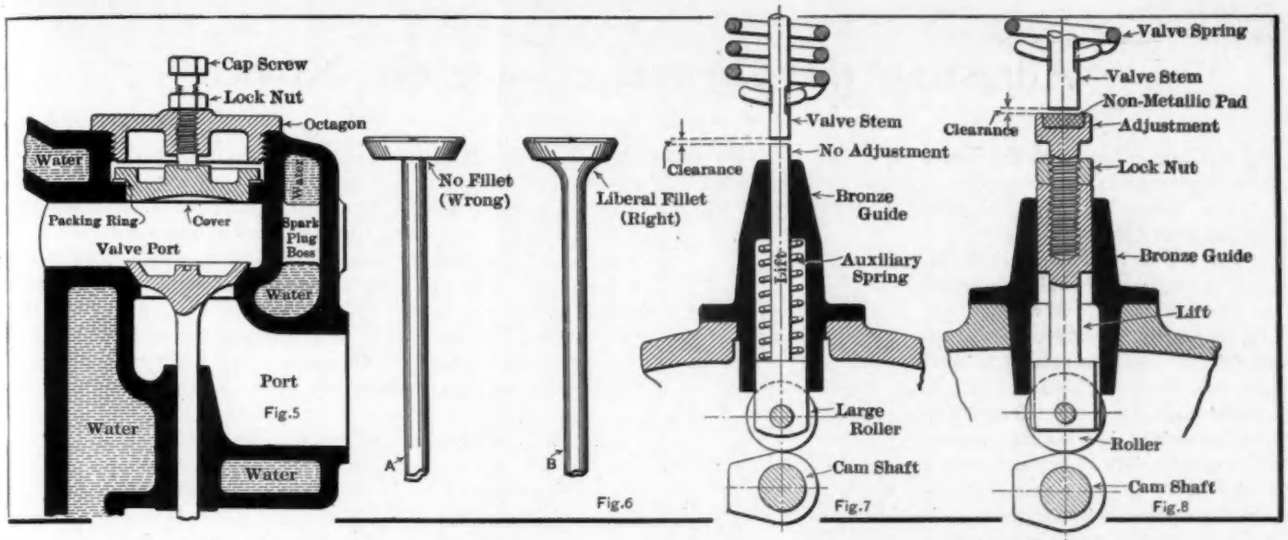


Fig. 5—One method of retaining valve cover in place from above. Fig. 6—Right and wrong way of constructing valves. Fig. 7—Valve construction in which no adjustment is provided for wear, as contrasted with Fig. 8—Proper form of construction with adjustment

the mushrooms on the stems forming the valves were integral, but the joint was made without taking advantage of more than a perceptible fillet. A, Fig. 6 indicates the character of the design, whereas B, is more nearly in accord with the dictates of approved practice. This is an extremely important detail, so it is believed, and tightness of the valves depends upon the rigidity of the relation of the mushroom to the stem. If the point of fastening is only equal to the diameter of the stem, the mushroom will be heated to a very high point relatively to the temperature which will obtain in the stem, so that the stem proper will take on the characteristics of a dog's tail and curl up. The result will be that the stem will stick in the guide unless the guide is provided with excess clearance, and the mushroom will be prevented from lying flat on the seat.

It ofttimes happens that motors perform badly, and credit is given the valves for being mechanically in good order, so that the trouble is blamed on the ignition system or the timing. In divers of these instances, it was ascertained that the valves stuck when they became hot, and the resistance offered was in excess of the ability of the springs. It is not a real remedy to attach stouter springs, and there are disadvantages in so proceeding. The stouter the springs the greater will be the wear on the cam, roller, lift, and the end of the valve stem. If a soft pad is used in the head of the adjusting member, as shown in Fig. 8, it will be pulverized if the spring is too strong; or in the absence of a buffer such as this, the end of the valve stem will broom out. The trouble is due to the curling up of the stem because a means is not afforded for transmitting the heat away from the mushroom, down through the length of the stem, and off to the water jacket, in the manner as before stated.

A very liberal fillet at the junction of the valve stem with the mushroom not only prevents the curling up of the stem by equalizing the temperature throughout, but it also prevents the mushroom from tilting out of its position at right angles to the plane of the stem. There are two reasons apparently for placing a fillet of liberal proportions at the junction, one of which is to impart mechanical rigidity to the mushroom, and its joint with the stem; the other reason is bound up in the greater mass of metal which is available for the transfer of heat. If the maker of an automobile fails to observe these well understood conditions, the repair man, if he appreciates the true situation, is offered a wonderful opportunity to deliver a satisfactory repair and materially improve the actual working qualities.

Should a repair man decide to substitute new valves of his own make for those regularly in use in a given model of automobile, it will be well for him to take into account the proper grades of metal for the intended work. One fabric used for valves is composed as follows:

HIGH CARBON STEEL SUITABLE FOR MAKING VALVES

Carbon	Silicon	Sulphur	Phosphorus	Manganese
.115	.10	.013	.013	.45

It will be understood that these valves will scarcely obtain without variation as between heats, or within adjacent sections in the same bar. Segregation and other variables will defeat the puddlers' attempt, but the carbon should be at least 110 points, and the sulphur and phosphorus should fall below the values given, rather than to exceed them. Manganese and silicon may vary quite a little.

HIGH NICKEL STEEL HAS A WELL-DEFINED VALUE

Nickel	Carbon	Silicon	Sulphur	Phosphorus	Manganese
35.0	.20	.10	.012	.012	.35

Frequently, the high nickel steel mushrooms are attached to carbon steel stems. There is no objection to this if the joint is well made, both from the point of view of mechanical rigidity and in view of the desire to obtain the best heat-conducting ability. The electrical weld seems to be valuable for this character of undertaking, but the welding must be done under the most expert conditions.

When the pressure of the spring is excessive, and the valve stem brooms out in consequence, it becomes extremely difficult to adjust the timing, and a decided loss of power of the motor results. The motor referred to in the repair case was so designed that there was no means of making an adjustment, and as shown in Fig. 7, a large clearance is necessary because the diameter of the roller at the end of the lift as it bears upon the cam is large. An auxiliary spring concentrically related to the lift stem within the bronze guide housing helped to give life to the motion, andto prevent the large roller from bouncing off of the cam. This spring, however, lost much of its life in this service, and offered the further disadvantage of slipping out of place, and in contact with the constantly reciprocating lift, burrowed into the metal. This burrowing process, besides offering evidences of depreciation, also indicated that the motion was not perfectly free to act. A further examination of the mechanism showed that the end of the lift where it engaged the end of the valve stem was broomed out sufficiently to make the clearance in the bronze guide considerably less than that which originally obtained, so that the lift was sticky in the guide.

The repairer wanted very much to attack this problem for the purpose of introducing an adjustment, but the room afforded lent a very uninviting air to the situation, and he finally decided that it was in the path of wisdom to put the parts in good working order, compensate for the increased clearance due to the wearing away of the cam, and take advantage of the fact that the device served for a long time without showing serious

(*Continued on page 735*)

Adjusting the Carbureter—for the Novice

By HERBERT L. TOWLE

IN AN article last week the writer enumerated the four usual adjustments of an automatic carbureter of the auxiliary air valve type. The adjustable elements were as follows:

1. The float valve.
2. The needle valve controlling the spray orifice.
3. The auxiliary air valve spring tension.
4. The auxiliary air valve stop.

As previously intimated, this list varies in different carbureters. The float is always regulated in some manner, but it may be by the crude device of bending the float lever, instead of by a threaded adjustment. Some carbureters have no needle valve in the spray orifice, but instead substitute nozzles with one or another size of orifice to suit different engines. Still others control the size of the primary intake through which air is drawn past the spray orifice. The air valve spring is always adjustable, but the spring itself may be made to act very differently according to the size of the wire, diameter of the coil, and number of turns. When automatic carbureters were new it was not uncommon to find them fitted with springs wholly unsuited to the work in hand, so that the only thing to do was to wind springs experimentally till a suitable one was found. We will first assume that the spring is suited to the carbureter and only needs tension adjustment.

In some carbureters with no needle valve spray adjustment, the auxiliary air valve has two springs, one very light and responsive to slight suctions, the other heavy enough to take care of the suctions due to medium and high speeds. In such carbureters the spray nozzle is correctly chosen at the factory, and the owner adjusts the light air valve spring for low speeds in lieu of a needle valve.

The novice's general instructions for adjusting his carbureter are as follows: Assume that the float valve is correctly adjusted for gasoline. Prime the carbureter, usually by depressing the float, but sometimes by closing a choke valve in the primary air intake to increase the suction. Set the gears in neutral and the throttle valve slightly open and run the engine idle at low speed with retarded spark. Adjust the needle valve, if there is one, otherwise the light air valve spring of the primary air intake, to make the engine run best with the given spark and throttle. Now open the throttle a trifle, allowing the engine to run at about its maximum road speed or a little higher, and advance the spark about half or two-thirds. As the engine is not loaded it will not take much gas, but the auxiliary air valve should open a little. Adjust the air valve spring tension till the engine runs best under these conditions.

Next try the car on the road. Retard the spark and run the car as slow as possible in high gear. Try slightly increasing and decreasing the spray opening and note result. An opening of an eighth to a quarter of a turn of the needle valve is likely to be sufficient. If the engine backfires the needle opening is too small. Be particular to change only one adjustment at a time, otherwise you will not know where you stand. When you get a good adjustment it is well to mark it, so that you can come back to it if an unsuccessful change is made.

Now run the car at medium speed in high gear. Note particularly the pulling power on grades, and the promptness of the response on opening the throttle. If the engine weakens when the throttle is opened it indicates a decided change in the mixture. Try slackening and tightening the auxiliary air valve spring a little and note result. The adjustment previously obtained on the floor should be nearly right, but is likely to need slight changing.

Finally try high speed. If, when running at 20 or 25 miles an hour with the muffler open, the car accelerates smartly on opening the throttle wide, you have a good adjustment. Adjust the auxiliary air valve stop to give a little more or less lift, and note the result. Try slightly changing the spring tension also. Quite likely the same adjustment will not give equally good results at medium speed and high speed. If that is the case, and you do not care to experiment with other forms of spring, it is best to favor the medium speed adjustment as being that most used. Quite possibly a slight further change in the needle valve adjustment may seem advisable. If so, remember that opening or closing the needle valve increases or reduces the gasoline supply throughout the entire range of carbureter action. Increasing the air valve tension, on the contrary, has its greatest effect at

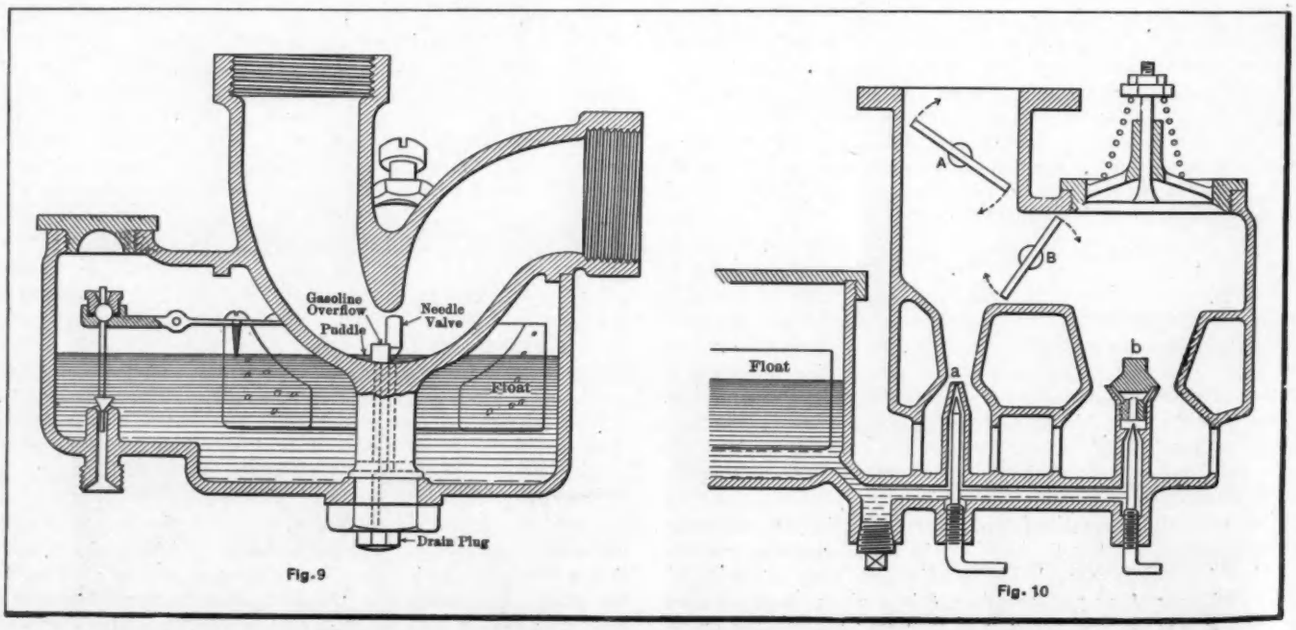


Fig. 9—Typical puddle type carbureter. Either the top or side opening can be used for the outlet. No auxiliary air valve is used. Only the gasoline level and needle valve are adjustable. Fig. 10—Two-nozzle type of carbureter. B remains closed until throttle valve A opens enough to pass as much mixture as the spray nozzle A can furnish.

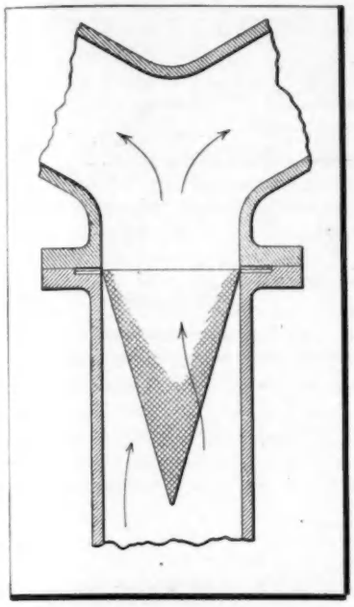


Fig. 14—Gauze cones are sometimes inserted in the intake pipe to break up the gasoline spray

the particular speed or suction at which the valve starts to open, and the effect is relatively less at high speeds. As the spring is always under some initial tension a certain minimum suction is required to start the air valve, and a comparatively slight change in spring adjustment will make a material change in this suction.

In case no combination of needle valve, air valve spring and stop adjustment gives satisfactory results throughout the engine's range, either the carbureter is too large or too small for the engine, or the design is defective at some point. Before abandoning the carbureter it is best to try the effect of changing the spring. To do this intelligently the user must understand something of the action of coil springs. A complete analysis of this subject lies outside the scope of this article, but its most essential points are as follows:

1. The "tension" of the spring (i. e., the force exerted by it under stretch or compression) is the tension of each individual coil composing it, and this tension is directly proportional to the amount that that individual coil is compressed or extended.

2. Consequently, the total stretch or compression of the spring is the strength per coil, multiplied by the number of coils.

3. Inversely, to produce a given stretch or compression, the fewer the coils the greater will be the tension required, and vice versa. To produce a light tension with a given total stretch or compression a spring should have many coils. To produce a strong tension with given compression or extension the spring should have few coils.

4. Extending a spring by merely stretching it has only the same effect as screwing down the retaining nut. It does not alter the character of the spring.

5. A coil with small diameter requires a greater force to compress or extend it than a coil with large diameter, the ratio being inversely as the diameter.

6. The stiffness of the spring is proportioned to the cube of the diameter of the wire.

To show how to apply these principles, let us assume typical cases:

1. Suppose the mixture is correct at moderate speeds, but too lean at high speeds. Adjusting the stop for a smaller lift will correct the trouble if the latter exists only near the limit of speed. If it occurs below the limit of speed the effect of reducing the lift will be to make the mixture again too rich at maximum speeds. This situation calls for a spring which, while exerting some tension at low speeds, has a much greater tension at high speeds. Cut one coil at a time from the existing spring and bend the end square. Adjust to give the same tension as before when the valve opens. The tension at maximum opening will be greater as the number of coils is reduced. If necessary, pull the spring out longer and change the adjusting nut accordingly.

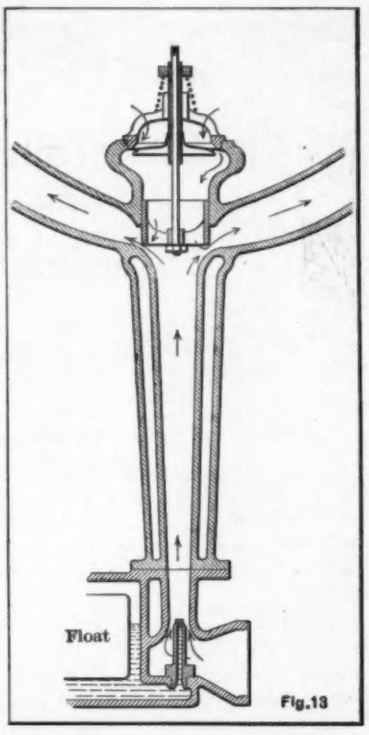


Fig. 13—Carbureter having hot-water-jacketed mixing pipe with throttle at the junction with manifold

2. Suppose the mixture is much too rich at low speeds, correct at medium speeds and again too rich at high speeds. Probably the spray opening is too large for the engine. Substitute a smaller nozzle if you can. If not, reduce the needle opening, or enlarge the primary air intake so that it is adjustable. If the former is done, the mixture will probably be correct at low and high speeds, but too lean at medium speeds. Increase the tension of the auxiliary air valve a trifle and adjust the stop for a greater lift. Follow the same procedure in case the primary air intake has been enlarged. If the design does not permit any of the above changes, the air valve may have a special light spring for low tensions.

(To be continued)

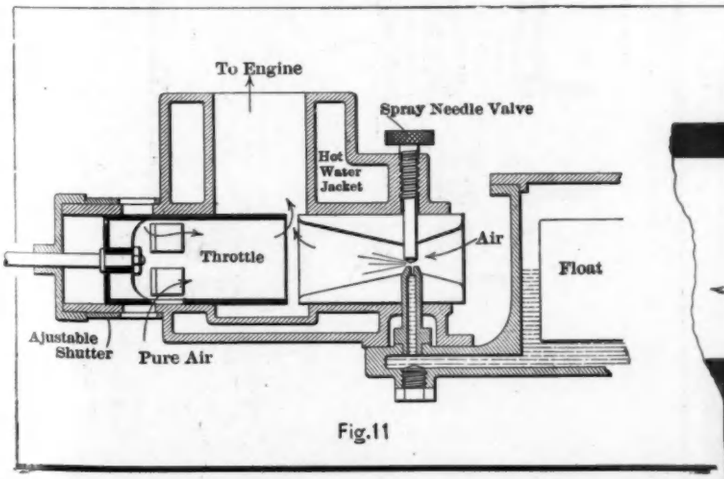


Fig. 11—Non-automatic carbureter, controlled by the movement of the

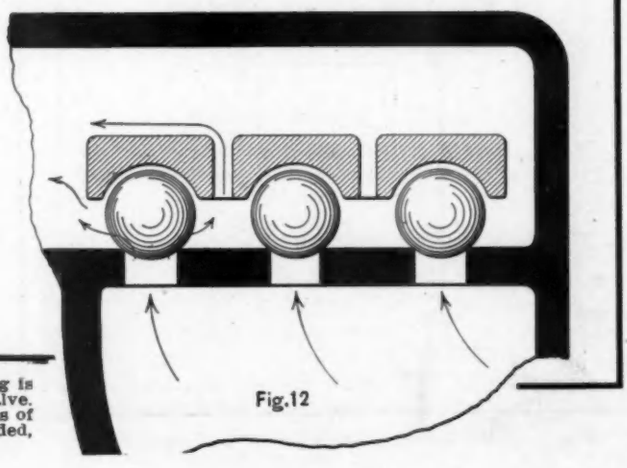
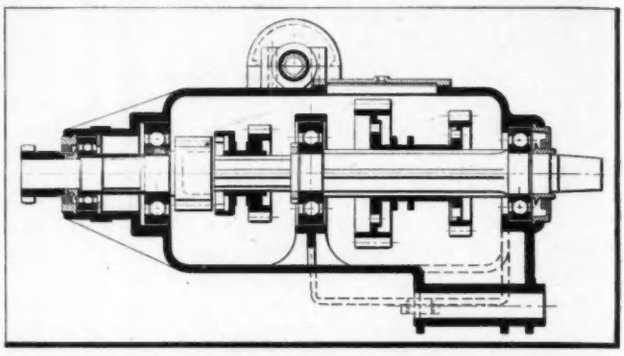


Fig. 12—Gravity seated bronze balls o different sizes are used for an auxilia since the suction of the engine uncov

in which the auxiliary air opening is mechanically-operated throttle valve. f varying diameter resting on holes of ry air valve, no springs being needed, ers holes of the correct area.

Constructional Details From Engineers Abroad



Protos Change Gear Showing Bearings on Shafts

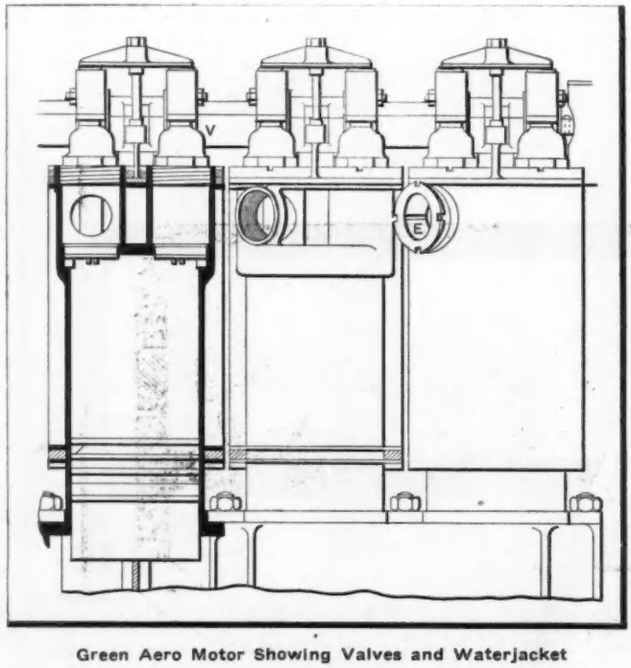
Method of Attaching the Copper Waterjacket

Of the various aeronautical motors exhibited at the recent London aeronautical show none was more favorably received than the Green, an English make with a record of several years' satisfactory service. One point of the motor which few noticed was the method of attaching the copper waterjacket, which is shown by the accompanying drawing.

The cylinders are individual, and the jackets are simple cylindrical copper tubes. At the bottom end of the jacket the cylinder has two narrow flanges, forming between them a groove, in which is placed a gasket or ring of gray rubber. The lower end of the copper jacket is slightly bell-shaped, so that it can be forced over this gasket, the process being assisted by the use of soap as a lubricant. At its upper end the jacket is slightly flanged inward, where it rests on a flange turned on the cylinder head, and is held by a ring clamped by nuts screwing down on the pockets of the overhead valves. The construction can be better understood from a study of the drawing.

Having a sliding joint at the bottom end of the jacket allows a slight movement to compensate for inaccuracies in fitting, so that the upper joint can always be screwed down to a firm seat, and at the same time allow for expansion due to heat. It might be expected that the rubber would be deteriorated by the heat, but it is said that motors of this type have been running for several years without renewals of this part.

The inlet and exhaust ports pass right through the jacket, holes being made in the latter to register with the ports. The manifolds are made with union joints, screwing down to a seat, and the edges of the holes in the jacket act as gaskets for the joint. Thus both the gas passage joints and the gasket joints are made tight at one stroke.



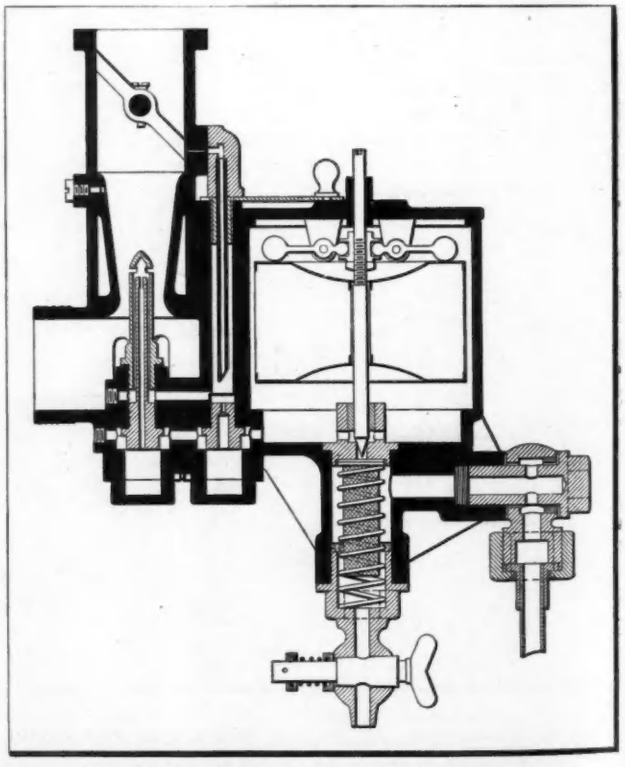
Green Aero Motor Showing Valves and Waterjacket

Overhung Shaft in German Change-Gear

Common practice in the designing of change-gears appears to be to reduce to the minimum the number of overhung shafts, and doubtless this is good as a general principle. Thus the lay-shaft and the sliding-gear shaft are almost invariably supported by bearings at their extreme ends.

On the 18-38-horsepower Protos (German) this principle has been disregarded, and, as it appears, with some reason. It is customary to have one of the bearings of the sliding-gear shaft telescope into the stub shaft which is in line with it; this bearing is either a plain bushing, or else a ball-bearing, the diameter of which is determined not so much by the load as by the space limitation. This bearing often gives extremely unsatisfactory service, and is nearly always the first bearing in the change-gear to wear out.

In order to avoid this construction, the designer of the Protos decided to place the second bearing of the sliding-gear shaft



New De Dion Carbureter on "Zenith" Principle

between the two sliding members, in such a way that that part of the shaft carrying the high-speed clutch and the third-speed gear should be overhung. At first glance this design appears only to make a bad situation worse, but a closer inspection will show that the good points considerably outnumber the bad.

When the high speed is engaged the sliding-gear shaft and the stub shaft act as a unit; there is none of the load on the bearing which comes from the thrust of gear teeth. When the third speed is engaged, on the other hand, the third-speed gear lies close against the bearing, and is overhung a distance equal only to its own thickness. In this respect it is no worse than the constant-mesh gear on the stub shaft. Further, the removal of size restrictions permits the use of a large bearing. In this particular case the bearing in question is as large as the main bearing of the stub shaft, and larger than any other in the case. To be exact, the two large bearings are number 408; the rear sliding-gear shaft bearing is number 309, the rear lay-shaft bearing number 406, the forward lay-shaft bearing number 308, and the forward stubshaft bearing number 307.

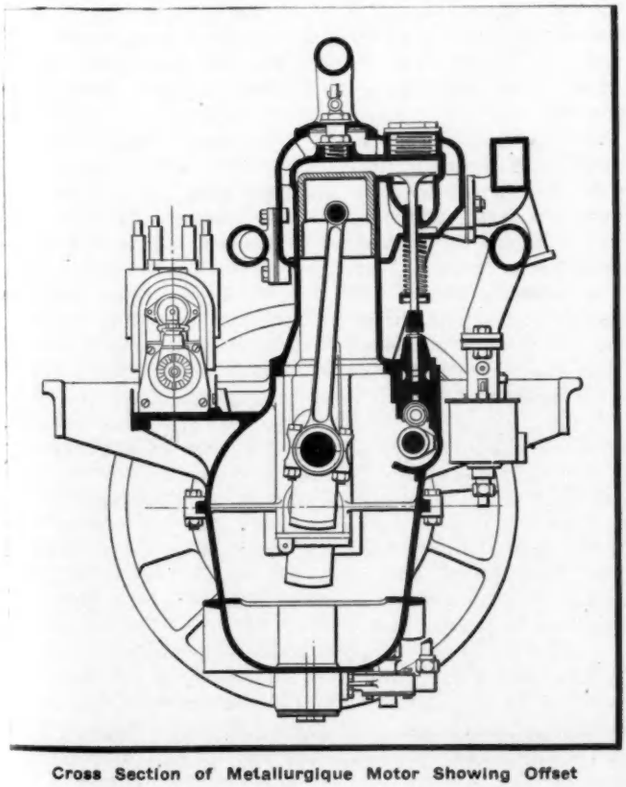
De Dion Adopts New Carbureter Principle

Multi-jet carbureters are far from novel, but most devices of this type have the jets arranged in a row, with some mechanical means for bringing them into action in succession. The carbureter adopted by De Dion-Bouton for its 1910 models, working on what is known as the "Zenith" principle, has its two jets concentric. The general arrangement is shown by the sectional drawing reproduced from *The Autocar*.

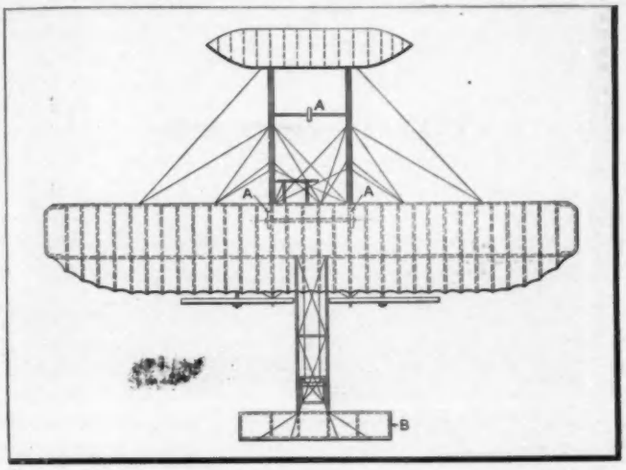
The automatic action of the carbureter is due to the limitation in the speed of the gasoline flow to the outer of the two concentric jets. The float chamber supplies both jets, but, whereas the gasoline reaches the central jet through large channels, the supply to the outer jet is limited by the small orifice through which it must pass. Between the float chamber and the central jet there is a cylindrical chamber open to the air. When at rest, the gasoline rises in the two jets to the same height.

At slow speeds gasoline is drawn from the two jets in about equal proportions. In a single-jet carbureter the proportion of gasoline to air increases with the speed at which the air passes the jet; but in this type the output is in correct proportion at all speeds, because the supply from the jet remains constant.

In the cylindrical chamber between the float chamber and the central jet is a small tube, the upper end of which connects with the inlet pipe just at the throttle valve. The valve is arranged so that when it is nearly closed all the mixture that passes through must go directly over the end of this tube. The air passes at high speed, even when the engine is turning slowly, so that gasoline is sucked up through the tube. This additional supply greatly facilitates starting the engine, and makes priming unnecessary; it also allows the engine to be run at very slow speeds.



Cross Section of Metallurgique Motor Showing Offset



Plan View of Wright Biplane Showing Wheels and Tailplane

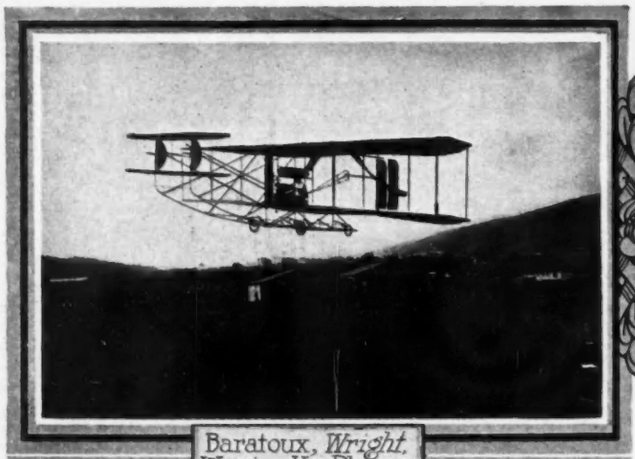
German Wright 'Planes Have Wheels

All the Wright aeroplanes made by the Deutsche Wright-Gesellschaft will henceforth be fitted with wheels and tails, according to the *Automobil-Welt*. The accompanying drawing shows the new machines in plan view. The wheels are three in number, and are attached one to each of the two skids, just under the front edge of the planes, and one forward of these, attached to a cross-member. It has been found that with these wheels the teaching of purchasers to operate the machines is much simplified, as the beginners can make short flights on their own account without using the starting derrick.

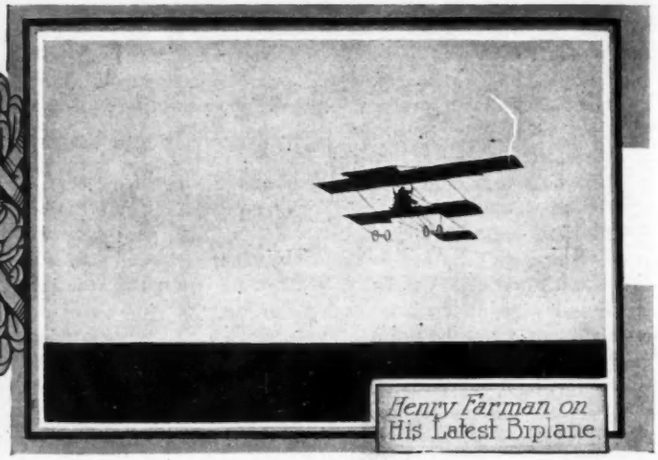
The dimensions of the aeroplanes being built by the German company are given by *Automobil-Welt* as 12.50 meters wide, 9.50 meters long and 2.75 meters high, mounted on wheels. The main planes are 12.50 meters across and 2.00 meters deep; the forward horizontal rudder is 4.65 by 0.95 meters; the propellors are 2.60 meters in diameter. Improvements in the motor have reduced the weight from 108 to 95 kg., increased its output from 28 to 33 horsepower, and at the same time reduced the gasoline consumption from 400 to 290 grams per hour.

Unusual Amount of Cylinder Offset

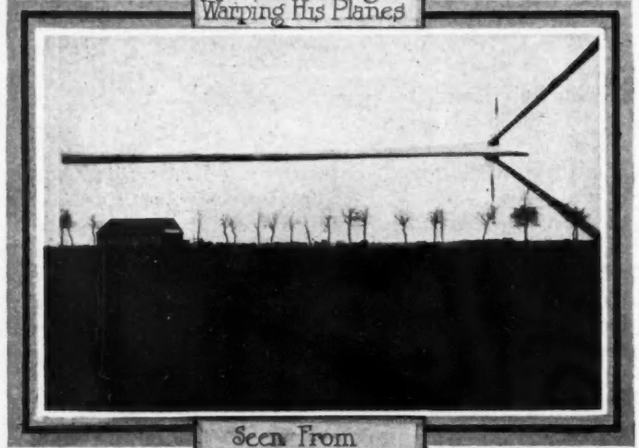
Offsetting the cylinders from the crankshaft is a recognized and legitimate practice in automobile design, but few designers have dared to go to the length shown in the accompanying sectional drawing of the motor of the Metallurgique (Belgian) 12-14-horsepower car. Although no exact measurement of the offset can be found, it is apparent from the drawing that the amount is nearly half the cylinder bore. The motor in question has a bore of 75 mm. and a stroke of 110 mm. (approximately 2.95 by 4.33 inches). Thus the offset is approximately 1 1-4 inches for a 4 3-8-inch stroke. This motor also has the valves slightly offset from the camshaft. It will be noticed that the designer has found it necessary to spread out the lower part of the cylinder bore to give the connecting rod free action.



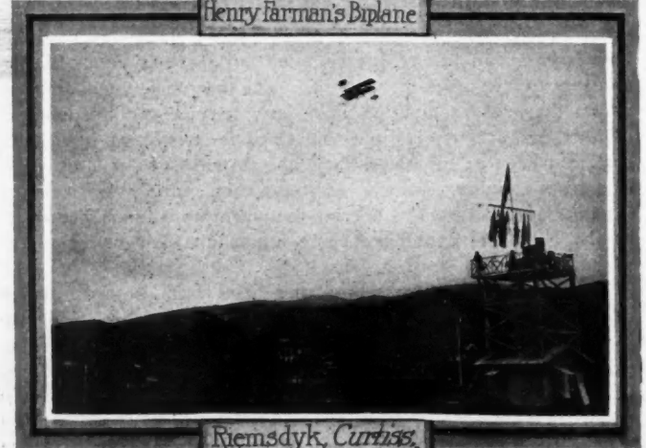
Baratoux, *Wright*, Warping His Planes



Henry Farman on His Latest Biplane



Seen From Henry Farman's Biplane



Riemsdyk, *Curtiss*, in front of Grand Stand

Sands, *Antoinette*, competing for Distance Prize

CANNES, FRANCE, Mar. 28—Never has an aviation meeting been heralded by such a fine series of performances as were shown here yesterday. All the flyers were in the air, doing their utmost to beat their rivals, with the result that many flights of over an hour's duration were accomplished. The only accident of the day befell Molon, one of the favorites. On his Blériot he was the first away, quickly joined by Christiaens on his Farman. For some time the two raced with each other, until at one of the corners, when Christiaens was overtaking his rival, there was a miscalculation by one or the other, which resulted in the monoplane being thrown off the course and landing in an adjacent field. Molon was unhurt, except for a cut on the face, but his machine was badly damaged. Later in the day, however, he made his appearance on another machine and succeeded in covering several laps.

The meet was organized by the city of Cannes, under the patronage of the Aero Club of France, and the different events are held under the rules of the International Aeronautic Federation. The prizes amount to a total of 100,000 francs. Among the more important of the events scheduled are the prizes for first laps, which are rewards of 500 francs for each of the twenty aviators first to make the circuit of the course; the prizes for the longest single flights, amounting to a total of 10,000 francs; the grand prize of Cannes, for greatest total duration of flights by a single aviator, and a prize of 20,000 francs for the winner of a cross-country flight of 19 kilometers over a specified course.

Most of the competitors who have engaged their entries are comparative novices; but nothing could better show the ease with which the new sport is learned than the excellent performances these same novices made. Farman biplanes, of the type made familiar in America by Paulhan, appear to predominate; they are used by Frey, Christiaens and Edmond, all promising drivers. Molon uses the Blériot monoplane; Hayden Sands, the American, drives an Antoinette monoplane; Baratoux has one of the French-built Wright machines, which has been fitted with wheels in addition to its skids, and Riemsdyk handles a Curtiss biplane, the only American-built machine to appear.

Henry Farman's new biplane has received much comment, favorable and otherwise, although no one doubts that this pioneer knows what he is about. The peculiarity of his latest machine is that the upper plane is wider than the lower, having five panels to three in the lower plane. The overlapping panels of the upper plane alone are provided with the hinged flaps for maintaining lateral equilibrium. On one of his flights in this machine Farman took up a photographer as passenger, securing some very interesting views.

Another clever photograph was secured of Baratoux' Wright machine making a turn and in the act of warping its wings. The increased curvature of the planes on the depressed side of the machine is clearly visible, as well as the flatter shape of those on the raised side. Baratoux may also be seen with his right arm extended to work the lever producing the warping.

Aeronautic Progress Along Constructive Lines

By MARIUS C. KRARUP

AVIATION is an art so young that intuition and invention play a greater part in solving its problems than science and engineering. Its data are insecure and scattered. Even in the fundamentals, there is more to be learned than has been learned, and probably a good deal to be unlearned. By a systematic and orderly discussion of aeronautic construction, which it is proposed to inaugurate in these columns, it should be possible to advance the art and concentrate inventive energies, as well as public appreciation, in channels where these important factors in new work will do the most good. But before proceeding to this orderly discussion, the unsettled condition of all knowledge on the subject makes it desirable to throw out feelers first in order to ascertain the present state of mind of all those most vitally interested in aviation matters, so that material may come to hand showing on what particular phases of the subject strong differences of opinion exist and where the center of interest is located. With this object in view, a number of assertive statements are presented in the following without proof or discussion, and dissenting opinions are cordially invited from readers who fail to agree with the statements made. Subsequently, in the more orderly but also more lengthy discussion, those portions of the subject on which most vital dissension exists, or which most keenly engage the interest of the workers in the new art, will then be treated most promptly and elaborately in text and sketches.

In horizontal aeroplane flight no power is spent in overcoming gravitation; all the power delivered by the propellers is completely used up in overcoming air resistance. Gravitation need not be overcome by a flying machine any more than by an automobile. It is the peculiarity of aeroplane action that it renders the atmosphere momentarily as unyielding under the surfaces of the aeroplane-machine as a hard road is under the wheels of an automobile. The less perfect aeroplane meets more air resistance, other things equal, than the better one; much as the poorly constructed automobile has more friction, of various sorts, to overcome than an automobile of higher grade and quality. There is a close analogy between air resistance in fliers and friction in automobiles, but the aeroplane constructor has the advantage that, when he improves his planes, he improves the road at the same time, because the plane makes its own road, as it flies, while the automobile builder must take the road, as he finds it. At present, planes adapted for fast flight differ in shape from planes best adapted for slow flight, but this is a shortcoming based upon faulty understanding of aeroplane action, faulty construction and the lack of suitable aeronautic materials. Machines can be built suitable for all speeds.

If the air resistance against the propulsion of a machine at the lowest speed at which it can fly equals $R+r$, in which R stands for the resistance against the propulsion of the supporting surfaces and r for the resistance of stanchions, body of aviator, engine, radiator, front edges of planes and other non-supporting parts of the machine, the air resistance at doubled speed and the same load will be $R-x+r^{2+}$; hence the extreme value of reducing r to a minimum. But if the load is doubled as well as the speed, the resistance will be in the form of $(R-x)^{2+}+r^{2+}$. The x is a small value compared to R and depends on the increased efficiency of a properly constructed plane when worked at small tilts. The exponent $^{2+}$ indicates that resistance increases somewhat faster than the square of velocity.

The curve of an aeroplane serves the purpose of establishing a cushion of somewhat compressed and somewhat confined air between the plane and the free atmosphere, thereby retarding the yielding of the latter, preventing the formation of eddies under the planes and contributing to an equable distribution of pressures. The curve is destined to be superseded by other means for accomplishing the same purposes. Among these means will be the introduction of flexibility and resiliency in large portions of the planes and the contrivance of compartment air pockets under those portions of the planes which remain rigid. These improvements are absolutely necessary for the automatic balancing of aeroplane machines in gusts of wind, but will also greatly increase the cost of their construction.

The cheap aeroplane is doomed. The irregular movements of the atmosphere are as fatal to a frail rigidity maintained by means of guy wires or steel tape as the unevenness of roads was to early automobiles with angle-iron frames and a rigid suspension of parts, forming a construction in which the most severe shock always found the weakest spot for its attack, by natural selection.

The efficiency of the power thrust from propellers in all present-day biplanes and monoplanes varies with the tilt of the planes in flight, and the tilt varies according to load and speed (speed always considered and measured in relation to the enveloping atmosphere). The power works directly in line with the resistance to motion only at one certain tilt for each machine. The tilt should be adjustable with relation to the direction of the propeller shaft and the whole power plant and the payload.

Other losses in power application are much larger. More than fifty per cent. of the engine power is wasted in setting up centrifugal stresses in the propellers. Hence the choice of four-bladed propellers by many French constructors, the small rotary velocity of the Wright propellers, the pointed ends of Cody's propeller. But more efficient improvements are needed.

If one propeller of seven feet diameter calls for thirty horsepower in order to be rotated at one thousand revolutions per minute, and wastes eighteen horsepower in centrifugality, five in friction and misdirection of thrust and delivers seven in useful propulsion, and another propeller of the same dimensions and shape is constructed so as to require sixty horsepower in order to be rotated at the same speed and pitch, the loss in centrifugality will be the same as in the case of the first propeller and the direction of forces will be the same. In the first case there was twelve horsepower left for thrusts against the atmosphere; in the second there is forty-two, which, divided in the proportion of five and seven, leaves twenty-four and one-half horsepower—available for useful propulsion. To accomplish this improvement in efficiency and applicability of high powers is plainly within easy range of mechanical feasibility, by compelling the atmosphere itself to produce the required pitch against a resilient resistance in the propeller, as the birds do with their wings and the fishes with their tails.

Four-bladed propellers should lose much of their efficiency in the higher strata of the atmosphere—where the pressure of the air column is smaller—and, as flying machines will be required to pass over high mountains as well as out of cannon range, two-bladed propellers placed tandem give more promise.

A headwind acting horizontally does not reduce the power required for flight but permits the aeroplane to rise more steeply, both from the ground and when in the air.

Kite action is less efficacious than aeroplane action. This has been observed by the Wrights and is explained by the fact that the whole atmosphere moves under the kite—or under the aeroplane held by power in the teeth of the wind—while the aeroplane propelled through a calm atmosphere meets an extra resistance and derives an extra support from driving the layer of air directly in its path against the quiescent air underneath.

The same cause makes aeroplane action somewhat more effective near to the resistant earth and supplies an explanation, when none better seems available, for the failure of many amateurish machines, in not leaving the earth more than a few feet, moving in a series of hops and bounds.

(*To be continued*)

Recent Trade Publications

Prominent on the first page of the American Locomotive Company's catalog is the famous Vanderbilt Cup, now in the possession of this company, and the idea is carried through the entire book by miniature drawings of the cup appearing beneath the trade name "Alco" in the corner of each page. The cover is in heavy linen paper with the design stamped in without the use of color, producing a distinctive effect; the design includes the word "Alco" and the outline of a touring car, behind which looms the dark shadow of a locomotive. It is a very creditable piece of work. There are 35 pages of text and illustrations devoted to the car which "stays new," both in touring, taxicab and commercial models.

More fully to set forth the lines and colorings of the Chalmers models, the catalog of the Chalmers Motor Company, of Detroit, is provided with half a dozen separate colored illustrations, on heavy cardboard, contained in a pocket on the back cover. Each of these shows some one of the Chalmers models in a coat of different hue—one in thistle green, one in red, one in hazel brown, one all in blue, one in blue with cream wheels, and one in blue with red striping. The catalog proper has 32 pages of good size, with clear-cut half-tone illustrations, and text in the well-known Chalmers style, which is good reading and at the same time instructive to technical man and novice.

Between covers of soft, heavy paper stamped with a gold design, the Anderson Carriage Company, of Detroit, sends out 55 pages of description and illustration of the Detroit Electric. The matter is arranged in a novel fashion. Every alternate pair of facing pages has on the left a picture of one of the Detroit models, and on the right the specifications of that model; the other pairs have on the left a photograph of the model of the preceding pages with some attractive detail of setting, or a view in the Anderson factory, and on the right a brief story of some of the cars' accomplishments.

As the original and native American, the catalog of the American Motor Car Company, Indianapolis, bears on its cover a portrait head of a pretty young lady in the aboriginal headdress, no doubt the forerunner of the only too familiar "peachbasket." The catalog contains four full-page plates of the different American models, in which the car is printed in black and the landscape background in a warm brown ink. The latter is also used for decorative borders on the other pages. The mechanical illustrations are especially commendable, there being an abundance of both general and detail views.

Shaft drive for electric cars is the chief talking point of the Baker Motor Vehicle Company, Cleveland, O., and its advantages are well set forth in a handsome catalog of 32 pages issued by that company. A cover of stiff grey paper with a design stamped in blue, black and gold forms, the outer dress, and within the various models are illustrated and described in an attractive fashion. The Baker line is unusually complete, including an even score of models, of which thirteen are shaft-driven; the prices range from $850 for a runabout to $3,500 for the landaulet and brougham.

"Buick 1910 Specifications" is the title of a small but well filled book issued by the Buick Motor Company, of Flint, Mich. It is printed on rough paper in two colors, line cuts being used only. The plan is followed of having a side elevation drawing of the car on the left-hand page, and its specifications, in a compact form, on the right. Seven different styles are shown, these being the two-cylinder model F, the four-cylinder model 10 as roadster, surrey and baby tonneau, model 16 as roadster and touring car, and the new model 17.

Two-cycle motors are steadily overcoming the prejudice opposing them, and the catechism contained in the catalog of the Atlas Motor Car Company, of Springfield, Mass., will go a long ways towards giving the final conviction. In the question and answer form, this expresses in popular language the advantages of the two-cycle construction. The catalog is unpretentious in comparison with some of the recent high art effects, but contains much real information, which, after all, is what the prospective purchaser wants.

The "Columbus Red Book," as might be expected, is the catalog of the Columbus Buggy Company, Columbus, O., devoted to that company's electric vehicles. The covers from which the catalog takes its name are a rich, dull red, and enclose 24 pages of medium size. After pages setting forth the advantages of the electric automobile, and describing the special features and advantages of the Columbus, follow photographs and specifications of the seven different Columbus models.

Striking in appearance is the catalog of the Black Mfg. Co., of Chicago, describing its Black-Crow cars; the sheet size is unusually large, and it is bound in covers of one of the new pastel shades of reddish brown, with the caption "1910 Black-Crow" in black. Although the pages number but 16, their size enables them to carry an ample amount of descriptive text, as well as large and clear illustrations. The text is particularly commendable in its accuracy and detail.

Dorris cars for 1910 are described in a catalog of convenient size. The pages are given a distinctive touch by a half-inch border of grey; those on the left hand carry illustrations of the cars and their parts, and are faced by pages of descriptive type. The full-page plates show the front and side views of the standard touring car, the chassis in plan view, the roadster and the limousine. The catalog is issued by the Dorris Motor Car Company, St. Louis.

Bailey electric vehicles are described in a neat booklet being sent out by the S. R. Bailey Company, Amesbury, Mass. The Bailey phaeton has particularly graceful lines, the frame being curved to correspond with the body design. This has the additional advantage of bringing the weight low. With the catalog comes a folder entitled "an appreciation," in which a prominent automobilist, who has owned 28 cars, tells what he thinks of the Bailey.

"Built and tested in the Berkshire Hills," can mean only the Berkshire car, the product of the Berkshire Auto-Car Company, of Pittsfield, Mass. The reading matter is reprinted from a trade magazine, and describes the car in considerable detail, in such manner that the technical man will find much value in it. On the inner back cover the specifications are summarized.

"Automobile Components" is the title of catalog G, from the Briscoe Manufacturing Company, of Detroit, Mich., and Newark, N. J. Besides illustrating the four or five principal plants of the company, much space is given to the square tube and tubular radiators, as well as the sheet steel products, which include hoods, fenders, fender fasteners and irons, drip pans, tanks, tool boxes, mufflers, steering wheels, and many other accessories.

Making a Demonstration

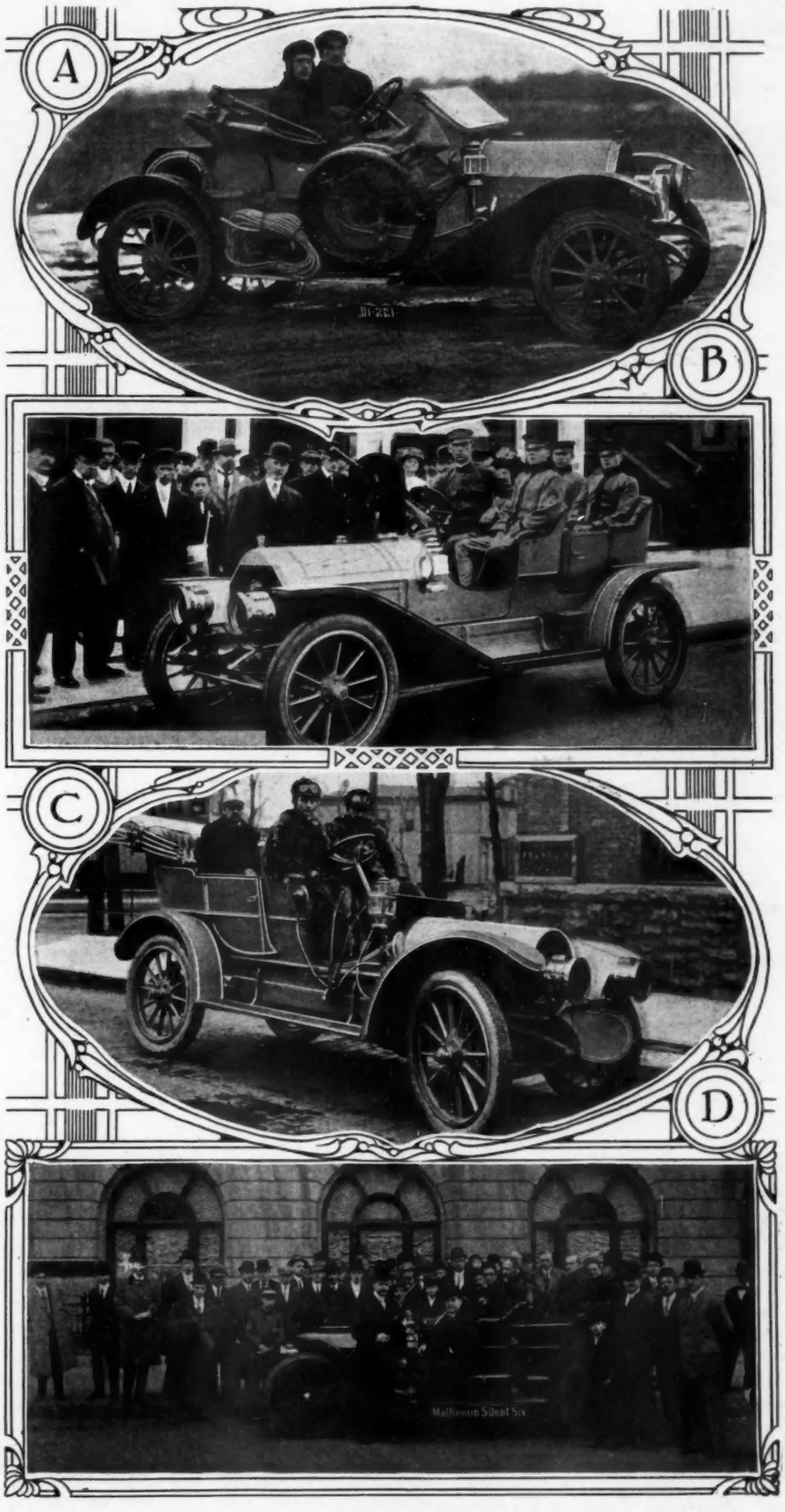
DEMONSTRATIONS are not alone the daily work, the source of bread and butter so to speak, of the agency and garage men, but are also closely interwoven into the work of the second-hand dealers, and a part of the routine work of the factory testers. This makes the subject of wide interest.

(A) Hudson runabout which has just completed a trip from Detroit to San Antonio, Tex., with the equipment which was carried along and which carried the car through many dangerous spots on the Western desert, in the alkali country and elsewhere. This trip was made in the dead of Winter, so that the perils of the road were greater than would be the case to-day. The long drive consumed four weeks, during which time J. S. Mohrhardt and Freeman Monroe, of Detroit, put in a very strenuous time.

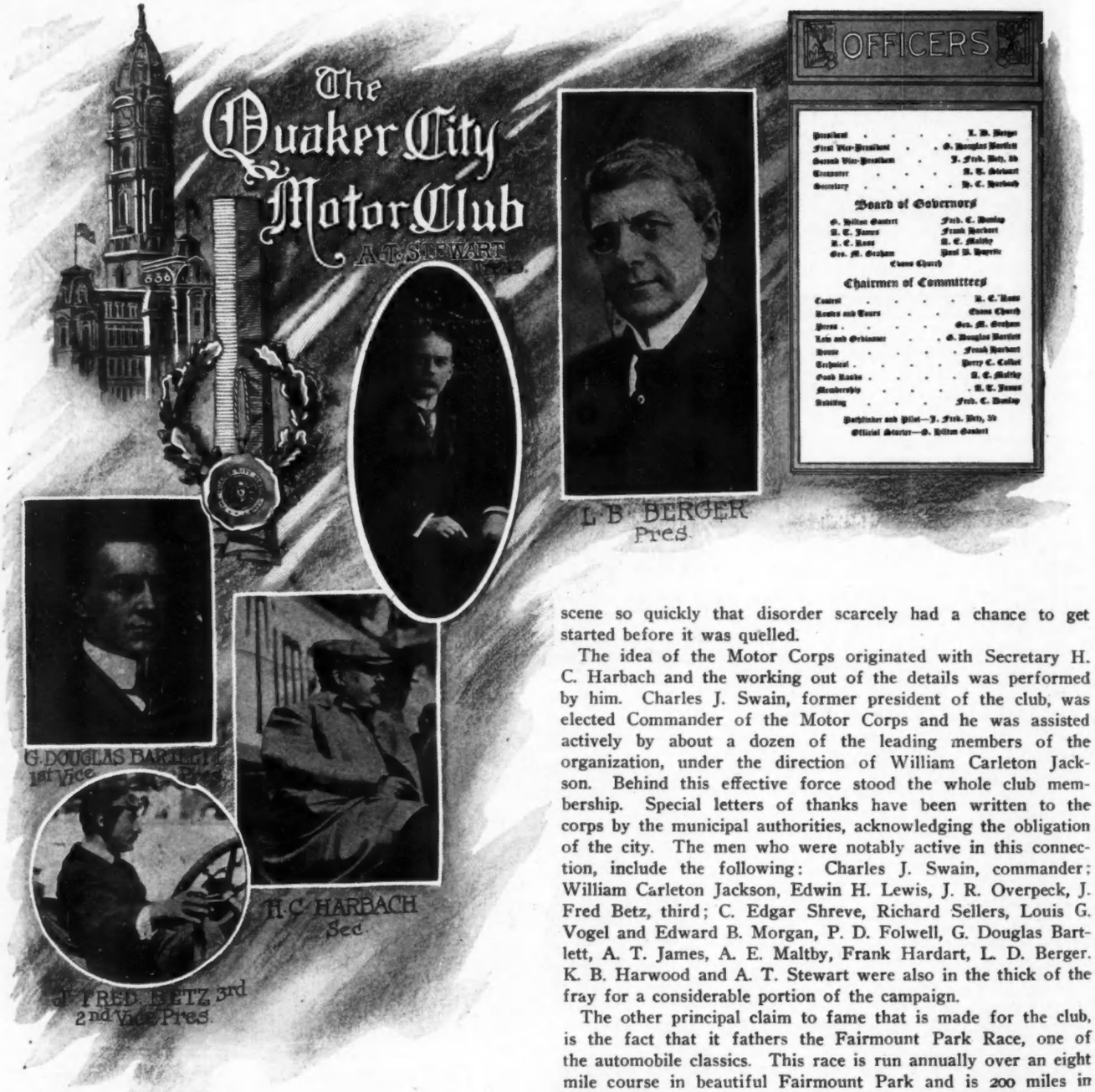
(B) Cadillac Thirty fitted with rapid-fire gun for army officers' use. The Northwestern Military Academy, Highland Park, Chicago, recently placed an order for a Cadillac Thirty fitted with a demi tonneau body, to which was added a Colt automatic rapid-fire gun. The armament was mounted directly upon the dash, so that it can be operated by the man alongside of the man at the wheel. With the gun equipment, the car weighs 2,500 pounds.

(C) Franklin six-cylinder car of 1910 model, which the owner, Mrs. Seaman, a Brooklyn woman, drove from the factory in Syracuse back to her home. The long trip was made without an untoward incident or a moment's trouble, which speaks volumes for the thoroughness of the factory testing of this make of car.

(D) A short time ago C. W. Matheson, president of the selling organization of the Matheson Motor Car Company, with offices in New York City, undertook to show to the newspaper and trade paper men of the metropolis the absolute silence of the new 1910 models of the Matheson, demonstrating at the same time the flexibility of the car by walking in front of it, throttled down, but with the high gear engaged.



A—HUDSON RUNABOUT, WHICH MADE TRIP FROM DETROIT TO TEXAS
B—CADILLAC THIRTY EQUIPPED WITH COLT AUTOMATIC RAPID FIRE GUN
C—MRS. SEAMAN DRIVING HER FRANKLIN FROM THE FACTORY TO BROOKLYN
D—DEMONSTRATION OF SILENCE AND FLEXIBILITY OF NEW MATHESON SIX



AN organization of motorists, actually popular with the general public and in high favor with the authorities of a great city, is rare enough to deserve special mention and such is the position and condition of the Quaker City Motor Club of Philadelphia. It is not the largest, wealthiest and most venerable body of men in Philadelphia, but the Quaker City seems to think that the club had an important part in controlling the recent street car strike, saving immense amounts of property and not a little of blood and violence and it is correspondingly honored. An active section of the membership formed a body known as the First Volunteer Motor Corps over two years ago and when the traction strike took place last February, the Emergency Patrol No. 1, formed of progressive members of the Quaker City Motor Club enlisted for the whole campaign.

The members were sworn in as special officers and the club donated the use of as many powerful cars as necessary and promptly assumed their duties. For forty days the motor corps was in service night and day and the concrete result was that whenever a riot call came in, there was a detail of police on the scene so quickly that disorder scarcely had a chance to get started before it was quelled.

The idea of the Motor Corps originated with Secretary H. C. Harbach and the working out of the details was performed by him. Charles J. Swain, former president of the club, was elected Commander of the Motor Corps and he was assisted actively by about a dozen of the leading members of the organization, under the direction of William Carleton Jackson. Behind this effective force stood the whole club membership. Special letters of thanks have been written to the corps by the municipal authorities, acknowledging the obligation of the city. The men who were notably active in this connection, include the following: Charles J. Swain, commander; William Carleton Jackson, Edwin H. Lewis, J. R. Overpeck, J. Fred Betz, third; C. Edgar Shreve, Richard Sellers, Louis G. Vogel and Edward B. Morgan, P. D. Folwell, G. Douglas Bartlett, A. T. James, A. E. Maltby, Frank Hardart, L. D. Berger. K. B. Harwood and A. T. Stewart were also in the thick of the fray for a considerable portion of the campaign.

The other principal claim to fame that is made for the club, is the fact that it fathers the Fairmount Park Race, one of the automobile classics. This race is run annually over an eight mile course in beautiful Fairmount Park and is 200 miles in length. The race is run the week after the Vanderbilt and it is estimated that last year 1,000,000 persons witnessed its decision. Besides magnificent plate trophies, the money awards to the placed cars. amount to thousands of dollars.

The race has one specially unique feature, in that the city receives all money realized from sale of seats and other concessions and divides it among several worthy charities. This fund is a material help to the institutions as it is liberal in size and constantly growing.

Aside from the Fairmount Park race, the club holds two race meets each year at the Point Breeze track and an annual Roadability Run. As described in a recent issue of THE AUTOMOBILE, the latter event will take place April 30, this year and will be to Atlantic City.

The club's quarters are in the Hotel Walton and while not large nor ornate, they are comfortably and tastefully fitted up The organization was started with a preliminary meeting Nov. 13, 1906, with George H. Smith, as president pro tem. in the chair. The first stated meeting was held a week later and the first regular meeting for organization was held at the Hotel

Majestic, March 7, 1907, when Charles J. Swain was chosen president. The first quarters of the club were in the Hotel Majestic from which removal was made to the Hotel Walton in March, 1909.

There are just 212 members on the club rolls, and each is an active, actual member with dues paid and interest alive.

Primarily the club is not a social organization, although about the usual percentage of its members take advantage of that feature of its life. It is dedicated to the sport of automobiling and its energy is directed toward popularizing the motor car by combatting prejudice and demonstrating its utility and enjoyable attributes. One of its chief aims is toward the general subject of good roads, acting as a factor in the State Federation of Automobile Clubs.

As an individual organization, the Quaker City Motor Club has done a vast work toward improving road conditions. Its road run from Philadelphia to Pittsburgh, over a course pronounced impossible by experts, was a mile-post in the history of motoring. It was costly for the club, but the spirit of the organization is the essence of good sport, so the club pocketed its loss and looked only on the remarkable accomplishment achieved by the race itself.

President L. D. Berger said that there was a tremendous field already open for useful work in the direction of improved highways. He pointed out that Pennsylvania is spending $4,000,000 a year in removing dirt from the gutters of country roads and placing it upon the surfaces of the driveways where the rains wash it back again and nullify the expenditure. He depreciated this sort of thing and said that the State organization, strongly aided by the Quaker City Motor Club was trying to provide for the expenditure of about $2,000,000 a year of the amount now wasted on the dirt roads, for the construction of permanent road improvements.

The men who form the club are prominent citizens of Philadelphia. They represent all lines of business and professional life and every phase of political faith, but they all unite in supporting the decalogue of the Quaker City Motor Club, which is as follows:

1. To assist all legislation for the furtherance of good roads.
2. To promulgate the idea that the automobile is the vehicle of the future and to strive for more liberal laws in regard to the same.
3. To encourage the automobilists in their realm of sport and to abolish impositions on the public highways.
4. To promote automobile contests in such a manner that the spirit of justice shall be embodied in all the rules and regulations.
5. To surround each event with the proper safeguard, so that an admiring public can witness the contests with full appreciation and perfect safety.
6. To endeavor to bring the sport of motoring to the highest level by the appointment of men of known experience and recognized ability as officers to carry on all contests.
7. To create new conditions in contests that will attract both the owner and the manufacturer.
8. To give trophies of intrinsic value, or rewards of real merit.
9. To promote social entertainment at stated periods during the year at which questions of the hour, referring to automobildom, can be discussed by capable men for the benefit of every member.
10. To make every man who owns an automobile feel that by belonging to the Quaker City Motor Club, he becomes part of an organization which is cohesive in principle and progressive in practice, ever ready to further the interests of the motor car, as well as to take care of the rights of the motorist.

In testing and contesting present laws, the club has tried to do a service to motordom generally. The contruction of the Pennsylvania statute as to the exact meaning of the term "chauffeur" was the work of the club. One of its members, Stanley Cooper, volunteered as a sacrifice and was arrested while driving a car belonging to a relative, he not having a chauffeur's license. He was fined in police court and on appeal the court of record held that a chauffeur is a paid driver and that Mr. Cooper had not broken the law. The matter is now pending on the State's appeal to the court of final resort.

The fundamental principle of the club is to subordinate individual and selfish aspirations and to unite to help the sport generally. In addition to this, much help will be given the industry as a whole, so serious as well as frivolous ends are served.

"CHAUFFEUR" IS A PAID DRIVER

PHILADELPHIA, Apr. 11—"A chauffeur is one who drives a motor car for pay," decided Judge Staake of the Quarter Sessions bench, in a recent opinion delivered in the action of the Commonwealth vs. Cooper. Several months ago Assistant Attorney-General W. H. Hargest when asked for an opinion in the matter by the State Highway Department, ruled that a chauffeur meant anyone other than the owner, who operated an automobile.

This opinion was so fraught with significance to the automobile public generally, that the Quaker City Motor Club decided to contest such an interpretation and a test case was prepared. Stanley P. Cooper, a member of the club who did not have a license, borrowed his sister's car and drove up Broad Street and around the city hall until he was arrested by a policeman who had been informed that Cooper did not have a license. He was fined $10 and appealed to Quarter Sessions where the appeal was sustained and the legal status of the chauffeur definitely outlined.

In his opinion Judge Staake declares that the laws of every State in which automobile laws have been passed, define the term "chauffeur" to include the idea of compensation for the operation of a vehicle. He said that if it had been the intention of the Legislature to require all operators of motor cars to be licensed under the present law, it would have made specific provision for such a condition. Under the ruling of Mr. Hargest it would have been necessary for each member of the family of a car owner, who wished to drive and who might be thoroughly competent to do so, to take out a license.

MARYLAND LAW SATISFIES MOTORISTS

BALTIMORE, MD., Apr. 11—Maryland's new automobile law will be in operation May 1, when the Commissioner of Motor Vehicles, created by the law, will begin his duties. This law, known as the Swann Motor Vehicle law, was passed by the Maryland Legislature and has been signed by Governor Crothers. There have been no kicks registered against it as it now stands, for the members of the Automobile Club of Maryland and members of the State Automobile Commission got together before the bill was introduced in the General Assembly and reached a compromise on the license fee section and other details that were not altogether to the liking of the motorists.

In consequence of this, some of the officials of the club were among those at Annapolis to speak in favor of the adoption of the law. That the law was adopted, too, was due to the efforts of Col. Sherlock Swann, author, and State Senator Linthicum, both of whom are members of the commission, as well as Governor Crothers, who backed the bill from the time it was framed.

FLORAL PARADE TO BE FEATURE

CHICAGO, Apr. 11—The Chicago Automobile Trade Association has decided to hold its floral parade May 7 in the afternoon. It is planned to have at least 500 cars in the turnout, and the awards will be made by a committee of prominent society women. There will be four divisions in the parade, three prizes being awarded in each. Much interest has already been aroused, so that success is assured.

Will Windshields Break at High Speed?

Editor THE AUTOMOBILE:

[2,224]—I have lately become a subscriber to "The Automobile" and am quite interested in the "Letters Answered and Discussed" section. I wish you would answer a question for me.

I frequently hit up a pace of 45 to 50 miles an hour when out on long trips in my machine, with the windshield up. Is this a safe thing to do? I have been told that the glass is liable to break from the air pressure against it. The shield is a standard make, flat front type, with a brass-bound seam across the center.

Was the Pope-Hartford machine that made such good time in the Portola race a stock chassis or a special? S. L. P.

The attention of readers is again directed to the note which appeared in these columns last week, requesting name and address with each letter. This letter came without name or address except the initials, but as it arrived before the warning we are using it, also for the sake of the interesting question which it brings up.

The pressure of the wind at a speed of 50 miles an hour, according to various authorities, may be taken at about 10 pounds per square foot. Fairbairn gives the following formula for the strength of a glass bar: $w = 3{,}140 \frac{bd^2}{l}$, which would give a modulus of rupture of 4,710 pounds. The formula for the breaking load of a beam supported at the ends and loaded uniformly is $W = \frac{4\,Rbd^2}{3l}$. Assuming a plate of glass one foot high, three feet wide and 3/8 inch thick, supported at the ends only, and substituting the known quantities, $W = \frac{4 \cdot 4{,}710 \cdot 12 \cdot 9}{3 \cdot 36 \cdot 64} = 294$ pounds. Compared to this, the 30 pounds pressure on the three square feet of surface presented to the wind is quite insignificant, the factor of safety being about ten.

Although most people do not appreciate the fact, glass is a comparatively strong substance. Its weakness is against sudden shocks rather than against steady loads. The 100 pounds per square foot pressure necessary to break an ordinary wind shield would only be attained at a speed of 160 miles an hour, which would be "going some," even for Barney Oldfield.

The Pope-Hartford that won the Portola race was a stock chassis.

License Fees and Car Ownership

Editor THE AUTOMOBILE:

[2,225]—Kindly answer the following questions in the columns of "Letters Interesting, Answered and Discussed"? Do I have to get a license or pay a fee to the city or state, to run a hacking car and own it? CONSTANT READER.

New York City.

Yes, it is a necessity to have a license for the car whether it be run as a hacking car or for pleasure. A New York State license is bought but once, and is perpetuated by request, so that the expense is very small. There would be no additional fee to pay to the city for a pleasure car, but a hacking license would be necessary, for which a small license fee is charged. That is, one fee for the car, whatever its use, and another fee to the city for a hacking car, would have to be paid.

Some Questions of Fact and Theory

Editor THE AUTOMOBILE:

[2,226]—Will you please answer the following questions through "Letters"?

1—Was the Marmon "50" ever fully described in "The Automobile" or any other journal? If so, please refer me to same. The Nordyke & Marmon Company does not make this car any more, but I wish to know something about it.

2—What kind of a clutch was used in this car? I am informed it was an excellent one and would like to know its mechanism.

3—Kindly give me some information on the subject of the differential; this is a part of the car I do not fully understand.

4—Does a car derive more power by adjusting the carbureter so that all the gasoline possible is given with a proper proportion of air, or is it better to give less gas and less air? What I mean to say is, are the very best results obtained by mixing the most gas and air possible, or are just as good results obtained by cutting down the amount mxed? GEO. W. WILSON, JR.

St. Louis.

Nordyke & Marmon never made a car rated at 50 horsepower. Their highest-powered car, to which you no doubt refer, was the 1908 model H, rated at 40-45 horsepower. As the cylinders of this car were 5 by 5 inches, 50 horsepower would not be an excessive rating, as things go. This car was described at some length in THE AUTOMOBILE, issue of January 16, 1908.

The clutch of this car was a multiple-disc, consisting of a comparatively small number of bronze plates studded on both sides with cork inserts, and alternating with steel plates. The Marmon Company now uses a leather-faced cone clutch.

When a car goes around a corner the outer wheels travel further than the inner ones, and so must turn faster. The differential allows them to do this, at the same time transmitting the driving power to them. One of the standard forms of differential has bevel gears on the inner ends of each of the live shafts, facing each other; three or four bevel pinions between these gears, their shafts radiating from the center of the live shafts; and a cage surrounding the gears, in which the pinions have their bearing, and on which is bolted the main bevel gear driven by the motor. The arrangement is such that if the cage is held stationary and one of the live shafts rotated, the other live shaft will rotate in the opposite direction, the differential acting as a reversing gear.

In action making a turn, the main bevel gears may be turning at a speed which would give each of the live shafts a speed of 100 r.p.m.; then if the outer wheel turns at 125 r.p.m., giving that side of the mechanism a positive velocity of 25 r.p.m. above normal, the differential, in its capacity of reverse gear, will transmit to the other live shaft a relative negative velocity of 25 r.p.m, reducing the speed of the inner side to 75 r.p.m.

The more gas, the more power, up to the maximum capacity of the cylinders; if it were possible to force the gas into the cylinders under pressure, still more power could be obtained. Cutting down the amount of gas, as you suggest, is simply throttling the motor, and will inevitably result in less power.

Date of Selden Patent

Editor THE AUTOMOBILE:

[2,227]—Will you please answer the following questions and greatly oblige an interested reader of "The Automobile?" On what date does the Selden patent expire? Is there any possibility of the owners of this patent gaining an extension after or beyond that date? Can any one build automobiles after that date without paying any royalty? F. R. ZEIGLER.

Oregon, Ill.

The Selden patent application was filed on May 8, 1879, and the patent was granted on November 5, 1895. Since the term of a patent is 17 years, the patent will expire on November 5, 1912. The sole object of a patent is to protect the inventor from the promiscuous use of his ideas during that term of years, and beyond that the Government does not go. That is, after the expiration of the 17-year term, the idea becomes public property and any one may manufacture, buy or sell machines embodying the formerly patented idea freely and without hindrance. On page 728, a discussion of this matter will be found.

Garage and Repair Shop Arrangement

Editor THE AUTOMOBILE:

[2,228]—I am a reader of your paper and am about to put up a garage to hold from twenty-five to thirty cars combined with a repair department. The building will be 85 ft. front by 66 ft. deep, and with a basement under part of it. Will you kindly let me know the best way of arranging the construction so that it will be efficient and convenient? Try and give me whatever suggestions you can to make the building suitable for the motor business. If you have had, in the past, any articles in your paper which bear on the subject, I would appreciate it if you would mail the issues to me and I will remit on receipt of your bill. J. SERHEGER.

South Bend, Ind.

Generally speaking, each car should have a floor space of at least 9 ft. width by 15 ft. length, or 135 sq. ft. This is not an invariable rule, and many garages find themselves able to handle cars right along in less space, but it is an average size which good practice would call for. This size of floor space would call for about 4,100 sq. ft. for 30 cars, while, in addition, an aisle down the center not less than 10 or 11 ft. wide would be a necessity. This in the depth of building mentioned would add about 700 sq. ft., or make the total 4,800. Since the building as spoken of would have over 5,600 sq. ft., the size is on the safe side. As to arrangements, that varies with individual preference and the location and character of the cars handled, the patrons of the place, and many other things. One very good plan is to have the ground floor given up entirely to live storage, with a specified, numbered place for each regular car. Then, utilize the top floor, or at least one of the upper floors, for dead storage. This will take little space, probably not more than half of one floor in the above case, and the balance of the floor can be given over to painting, varnishing and upholstering shops. Another floor should be given up to repair and machine shops, while the basement can be utilized for storage of materials, parts for the cars handled, and old or second-hand cars taken in trade. If an agency is to be taken as part of the program, the best part of the ground floor should be selected for this purpose.

In any case, the office should be alongside of the door, through which the cars must enter and leave. In the basement would also be placed the power plant, the air compressor, and similar tools. Provision should also be made for lockers, both for the men employed in the building and for the patrons. They should be located in a clean, light place, and made preferably of steel.

In starting a garage, much thought should be given to a simple yet comprehensive system of keeping the books. The materials of the garage, its floors, and its equipment, will all depend upon the tendency of the owner and builder, as well as to the class of people to whom the garage will be a home for their cars. In a series of articles about to be started in the paper, prominent New York garages will be described in detail, with illustrations, and where possible. floor plans. This series of articles will be of much use to you, and will start in this issue, the first one being found on page 739.

Polishes for Metal Work and Bodies

Editor THE AUTOMOBILE:

[2,229]—Will you please advise us as to the best metal polish and body polish on the market? CLIO MOTOR COMPANY.

Clio, S. C.

We cannot recommend preparations quite so definitely as you seem to desire, for obvious reasons. Besides, the best polish is largely a matter of personal opinion, and equally well-informed persons might favor different kinds. There are any number of special preparations on the market, many of them advertised in the advertising pages of this magazine, and we think it quite safe to say that any one of them, if used in accordance with the directions, will prove quite satisfactory.

For metal work a cheap and satisfactory polish may be made from whiting cut with gasoline. Of course, this must be prepared fresh whenever used, as the gasoline quickly evaporates; but as there is always plenty of gasoline around a garage, this will not be found a great inconvenience.

French Automobile Publications

Editor THE AUTOMOBILE:

[2,230]—Can you please give me the name and address of some good French automobile publication, of about the same high character as "The Automobile"? I would appreciate this information very much, or any information regarding French papers, as I subscribe to "The Automobile" and am very much pleased with the same. A. W. B.

Milwaukee.

There are about a half-dozen papers in the list of best published French papers. *Omnia* is published by L. Baudry de Saunier at 20 Rue Duret, Paris, and costs 25 francs per year. It is of a technical or semi-technical character, and contains on an average 20 pages per week. *La Vie Automobile* is a weekly, published by Charles Faroux at 47-49 Quai des Grands Augustins, Paris, at 25 francs. It is of a less technical character than *Omnia*, but a monthly supplement, *La Technique Automobile et Aerienne*, is devoted entirely to that side. The former amounts to about 16 pages per issue, while the latter is of the same size. The price of the technical sheet is 12 francs per year.

L'Automobile is a weekly in which more attention is given to clubs, sporting news, novelties, racing and the like than to technical matter. This is published at 19 Rue des Saints-Pères, contains 16 pages per issue, and is of slightly larger size than the usual. *La Pratique Automobile* is a weekly published by Mortimer Mégret at 12 Avenue de la Grande-Armee, Paris, at 13 fr. 50. Its 20 pages, of small size, are devoted entirely to sporting events of the automobile and aeronautical world.

Then, there is *La France Automobile et Aerienne*, the latter part of the name being a recent addition. It is a weekly of the usual size, 16 pages per issue, and 20 fr. per year. The subject matter is only slightly technical in character, and of late has assumed, coincident with the change in name, a decidedly aeronautical tone.

Why Do Not All Use Friction Drive?

Editor THE AUTOMOBILE:

[2,231]—Please answer in the columns of "The Automobile" the following questions:

1—Why do not all automobile manufacturers use the friction transmission instead of selective or planetary, and do away with the disc or cone clutch, etc.?

2—Is not the friction transmission more desirable on account of obtaining any speed from zero to limit on high gear?

3—Does not a car with friction transmission get more power delivered to the wheels than a car with any other kind of transmission of equal horsepower?

4—Is it not cheaper as to wear and cost of replacing to have a friction than a gear transmission? R. F. HENRY, JR.

Palm, Ala.

Probably the reason why all makers do not use the friction drive is that they do not believe it is the best for their purposes. We doubt if the average user of this gear uses more than three or four of the speeds available; he gets that many favorite positions and does not bother about the intermediate ones.

Friction transmissions, of the simple disc type, are never on the high gear, that is, in the sense that a car with direct drive on the high can be. The friction drive gets more power to the wheels than a sliding gear on its low speeds, but not so much as a sliding gear on high speeds. The friction discs must be replaced every few thousand miles, although the expense is small.

The Duration and Term of the Selden Patent

By XENOPHON P. HUDDY, LL. B.

THE SELDEN PATENT, which was declared valid by the Circuit Court of the United States for the Southern District of New York on September 19, 1909, was granted by the Patent Office in 1895 on an application filed in 1879, more than 16 years before the grant was made. The patent therefore has a remaining period of duration and term of two more years, provided that an extension is not obtained by a special act.

To those who are waiting for the expiration of the remainder of the term of this patent, let it be said that too much dependence should not be placed upon the patent rights being extinguished in 1912 and then becoming general public property. The Selden patent is now valid and alive. It has not yet expired, and until its life ceases forever, hopes should not be indulged in and plans should not be made too definite. Even though the seventeen years of the Selden patent cannot be extended under any general law, its life may be prolonged by a special act of Congress, the same as the Government has done in many other cases.

POWER OF CONGRESS TO EXTEND TERM

Congress possesses the power by means of a private act to grant an extension of a patent, even after the patent has expired and the invention has been introduced to public use. The patent thus extended is to be regarded as a patent for the entire time from the first grant to the end of the extended period. A person making articles under the patent in the interim between the expiration and extension has no right to use them after the extension is allowed.

Prior to the act of March 2, 1861, a patent ran for 14 years, with the privilege of extension for seven years longer, but by that act the term was limited to 17 years without a privilege of extension given under the statute. There is now no general act permitting a patent to be extended, so the only right which a patentee possesses is to apply to Congress for a special act. Whether Congress will grant an extension of time will depend upon the facts and circumstances of each case.

FACTS WARRANTING SPECIAL EXTENSIONS

At the expiration of the present term of the Selden patent the owners thereof have the right to apply to Congress for an extension of its life. In determining whether the application for the extension will be granted by Congress, the primary question to be answered is whether in justice the holders of the patent should receive an extension.

It may be claimed that the rights of the Selden patent are being grossly and openly violated, and that the holders of the patent have lost, and are losing, large sums of money which they are entitled to under the decision of the United States Circuit Court upholding the grant. The natural question to be asked, then, is, if the owners of the Selden patent have received all that is justly due to them under the patent during its term? These facts, taken into consideration with the fact that the patent was not granted until 16 years after its application, and the further fact that the automobile industry is one of modern development, would be most influential in obtaining from Congress the passage of a special act extending the term to expire several years hence.

Congress possesses the power to do this, and has often exercised this power. The following cases are referred to:

In the case of Jordan vs. Dobson, Fed. Cas. No. 7,519, the United States Circuit Court held that Congress has the power to authorize by special act the extention of a patent, notwithstanding the fact that the original patent had previously expired, and the invention has been introduced to public use. The court also held that a special act of Congress authorizing the extension of a particular patent should not be read and construed in connection with the general acts on the subject. In this case it was contended that Congress had no power to extend a patent by special act, but the court said:

"The eighth section of the first article of that instrument [the Constitution of the United States] ordains that Congress shall have power to promote the progress of science and useful arts, by securing for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries. This is a large power. It is not said when those limited times shall commence, how long they shall continue, or when they shall end. All that is left to the discretion of Congress."

In the case of Union Manufacturing Company vs. Lounsbury, Fed. Cas. 14,368, a patent was also extended by a special act of Congress. The court held, however, that where certain representations were made to Congress, upon the faith of which a patent was extended by a special act of Congress, the patentee will be held to his representations.

In July, 1862, Congress by a private act extended an expiring patent issued to Etienne Bernot, the inventor of a machine for cutting files. See New American File Co. vs. Nicholson File Co., 8 Fed. Rep., 816.

The patent for Woodworth's Planing Machine was extended from 1842 to 1843 by the Board of Commissioners. In 1845 Congress by a special act extending the time still further, from 1849 to 1856. See Bloomer vs. McQuewan, 14 How. (U. S.), 539, wherein the Supreme Court of the United States held as follows:

First—That a special act of Congress in favor of a patentee, extending the time beyond that originally limited, must be considered ingrafted on the general patent law.

Second—That under the general law in force when the special act of Congress was passed, a party who had purchased the right to use a planing machine during the period to which the patent was first limited was entitled to continue to use it during the extension authorized by that law. (This would apply to users of licensed cars.)

The extension of a patent may be granted to an assignee or to an administrator. Washburn vs. Gould, Fed. Cas. No. 17,214, wherein it is also held, in support of the recent Selden patent decision, that whoever finally perfects a machine and renders it capable of useful operation is entitled to a patent, although others may have had the idea and made experiments toward putting it into practice, and although all of the component parts may have been known under another combination or for a different purpose.

Wrights Define Their Patent Position

During his visit in New York last week, on returning from an inspection of the new aviation farm at Montgomery, Ala., Wilbur Wright issued a statement defining the position of the Wright Company toward aviators infringing the Wright patents.

"The report that we will permit any biplane or monoplane, regardless of who makes it or where, to compete in any aviation meet in this country is untrue," said Mr. Wright. "Unless its owner and navigator takes out a Wright license and agrees not to compete in unlicensed meets, we shall prevent their flying.

"We obtained the first aeroplane patents in 1906, and we have seventeen years, thirteen more, in which to enjoy our monopoly, provided we make our invention salable and protect it by law. That is the explanation of litigation instituted during the year."

Mr. Wright was asked regarding a recent report that the Government might purchase his patent rights and throw the field open. "Such a thing is possible, but hardly probable," he replied, "though nothing would please my brother and myself more. There was talk of something of that sort several years ago, but it fell through. We were approached by a committee of the Aero Club of America, which wanted to buy our patents. The offer looked big to us then and we might have accepted it, but the Aero Club committee allowed the matter to drag along until we put the question squarely up to them. We never received a reply, so we went ahead and developed our own invention.

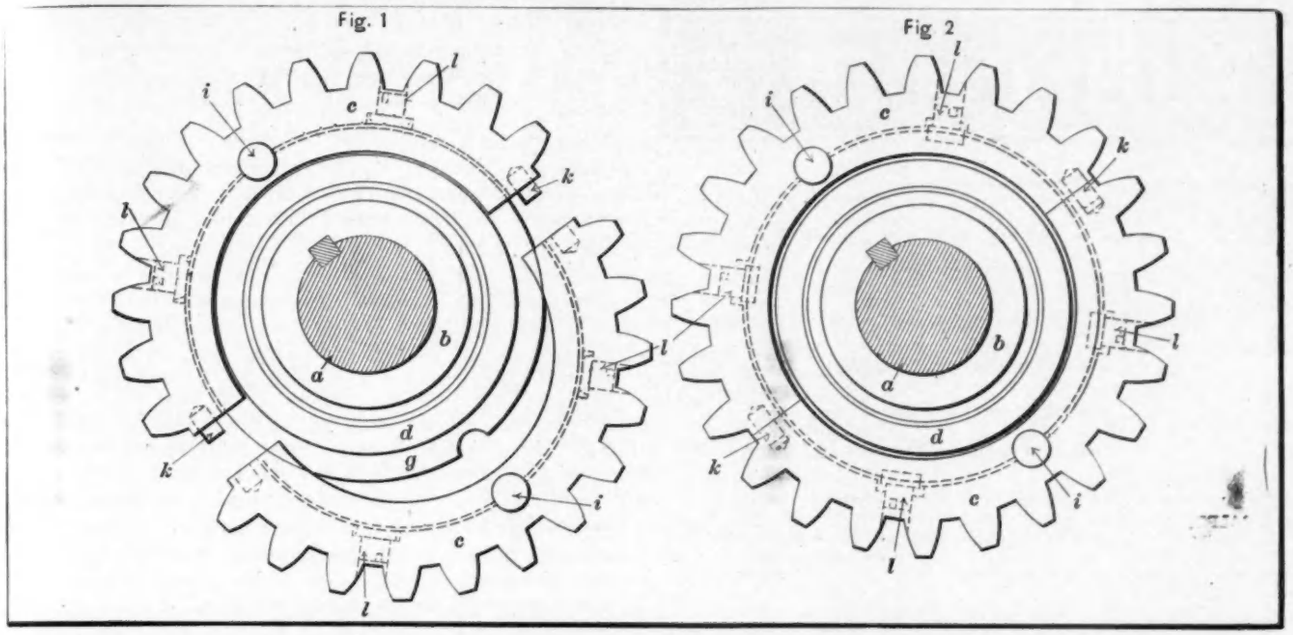


Fig. 1—Showing two sections of a gear made with the Sparr locking device, one half-gear being partly removed. Fig. 2—View of gear with Sparr device assembled and locked ready for use. l, l are the locking screws, i, i are the locking pins, and k, k the dowel pins

New Gear-Locking Device Appears Meritorious

WITH the modern tendency toward simplicity and small number of parts, many inventors have been induced to work on devices which either lessen the number of parts or improve the simplicity of the automobile as a whole. Any device which may be said to lessen the work of assembling or dissembling would come in the class of those simplifying the whole machine.

This is the exact definition of the locking mechanism which has just been invented by a Brooklyn man, Benjamin F. Sparr, and which is illustrated and described herewith. As the patent specifications state, "the object of this invention is to provide a separable or split gear, which may be put on or taken off a shaft without having to be slid along the shaft to and from the end." This is the case with all ordinary gearing, which is made solid with either a round or square hole through the center. To assemble or dissemble, the gear must be slid along the round or square shaft either from the end to its place in case of assembling, or from its place to the end, in the instance of dissembling.

Sparr does away with this by making the gear in two halves, which halves are locked to the shaft by means of a dovetail. In this dovetailed groove, a double locking ring, fundamentally narrower than the groove, locks the ring and shaft together by expanding sideways through the medium of a left and right-hand thread, each actuating one half of the locking ring. This movement of the locking ring is brought about by holding either the shaft or gear and rotating the other. When properly locked in place, the reverse or unlocking process is prevented by one or more taper-ended set screws, of the headless type, which are screwed in between the two halves of the locking ring, the inner faces of this being tapered to facilitate this action.

As the figures show, the two halves of the gear are made with dowel pins, for exact replacement, while a pin is driven through one half of one gear, so as to present a half-round projection into the groove, upon which an indentation on the locking rings fits.

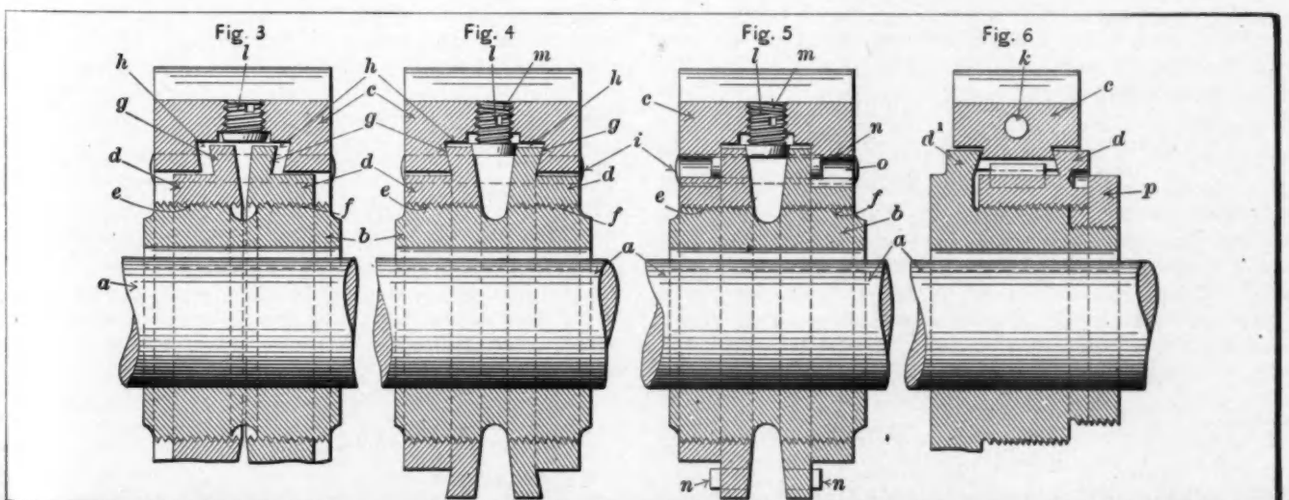


Fig. 3—Section through gear and shaft showing locking ring before expanding. Fig. 4—Same section showing the ring expanded so as to clutch the gear to the shaft, the taper ended set screw to prevent backing off being down into position. Fig. 5 and Fig. 6—Show two alternate methods of constructing the same device, one with an external taper instead of internal, the other with pins in a groove

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The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

The First Annual Banquet of the Association of Licensed Automobile Manufacturers, which was held at the Hotel Astor, April 7, brought together the executive representatives of 83 makers of automobiles, and the leaders of acumen in the industry who were there for the express purpose of enjoying an evening in each other's company. This is probably the first time that the captains of the automobile industry were enabled to assemble under conditions which would bring out expressions of a character which might be regarded as a true estimate of just what the automobile does mean to the industry, and to the public at large.

Something of the vastness of the automobile industry was reflected in the statistics utilized by Governor Fred M. Warner of Michigan, in his leading speech, and the best estimate, perhaps, to put upon the figures offered, is that they reached into such large numbers that they cease to be comprehensible. These figures were confined to the State of Michigan, and if, in a few short years, an industry reaches such proportions that statistics cease to convey information when they are confined to a single state, it does seem as if a project such as this has epoch-making principles.

It was pointed out, in the course of the evening, that the automobile, in addition to offering a means of livelihood to men counted in hundreds of thousands, is slowly but surely mending the hard spots in our form of civilization. It gives a means by which the farmers may transport their products to the market, without having to rely upon the less direct and more costly methods.

The very opposition offered to the automobile as the reliable agent of men of affairs, which opposition is expressed by immaturely contrived and vicious laws, is one of its most pronounced manifestations for good; it exposes the pigmy mind, and tells the world at large of the legislator who formulates at the dictates of his own pocketbook, and blinds him to the fact that the automobile, because of its merit, is the chariot wheel to which he is tied, that will roll him into the sea of oblivion.

As Colonel Charles Clifton very aptly and appropriately reflected, the co-operation which has been thus far extended by the builders of automobiles in America, has merely results in the crystallization of effort, and the elimination of useless and ill-advised opposition. The inertia of thoughtlessness and prejudice has had its say, it has done its best to bar the onward march of the automobile, and the time has arrived when nothing remains but to continue along co-operated lines, looking at things broadly, and remembering that inherent worth must govern the combined effort of the co-operators, and this will only be possible if worthy effort obtains at the behest of the individuals in their several walks.

It was stated, among other things, that the cost of all the automobiles which are made in a single year is a lower figure than the cost of repaving the streets of a single large city in that time, and it was also pointed out that repaving is brought about in consequence of deterioration, which may be directly traced to the presence of horses as used for transportation purposes. This deterioration is direct, in so far as shod feet destroy asphalt surfaces, and indirect by the process which will be here described as the chemical reactions involved, due to the presence of litter on unclean streets. It was said that in the long run, when automobiles only are used on city streets, the cleaning problem will be reduced to the efficacy involved in a machine process, and the cost will be reduced to the level of an infinitesimal increment relatively, whereas the advantages will be so enormous that they will be difficult, if not impossible, to count.

* * *

One maker of automobiles claims the proud distinction of having started an addition to its plant every week in every year of its existence so far. Whether or not this company has done more or less adding to its plant, as compared with divers other companies, is not the question of the moment. Additions are being made at a terrific rate in all the automobile centers in this country, and thanks to the foresight of the directors of the respective plants, these additions are of a permanent character. The buildings are, for the most part, of reinforced concrete construction, taking pattern after the most scientific processes of the day, incorporating into the plan the idea that no artificial means can be regarded as the rival of daylight, and it is to be had with a saving which is equal to the cost of the walls which are too frequently placed to exclude it. The saw-tooth idea has its substantial adherents, but some of the conditions of manufacturing demand a measure of concentration, and this requirement leads to the construction of buildings at least two or three stories high, which is not found to be sufficient reason for the exclusion of daylight—in modern industrial plants the sun shines for all, even the workmen at the bench.

Detroit Makers Push Building Rapidly

EXPANSION is the order of the day among Detroit automobile manufacturers, who find themselves in many instances unable to meet present demands. As a result, building activities are reaching hitherto unheard-of proportions. Chief among the concerns which have outgrown their present quarters is the Warren Motor Car Company, organized something less than a year ago. Work is already under way on the first of a group of factory buildings, the initial structure to be two stories and 600 by 60 feet. Two others will follow, each approximately 400 by 60 feet, and it is expected to have the last of these completed before the first of next year.

The Grabowsky Power Wagon Company has also begun the erection of a new plant, the principal buildings in which will be 300 by 62 feet and 200 by 40 feet, the latter to be used as a body building plant. Reinforced concrete will be used throughout, and the structures will be models.

The Long Manufacturing Company, of Chicago, makers of automobile radiators, auto tubings and other parts, will erect an immense plant in Detroit. The main building will be two stories, 325 feet long, and so constructed that four wings can be added to the rear.

The Detroit Dearborn Motor Car Company, which recently increased its capital stock from $50,000 to $100,000, is building an addition to its plant that will double its capacity.

Plans for the new Lozier plant have also been completed, and are now in the hands of builders for the purpose of receiving contracts. Work will be begun as soon as possible, and it is hoped to have a portion of the plant completed by midsummer. Organization of the company has been perfected, with the following officers: President, H. A. Lozier; vice-presidents, Gilbert W. Lee and Fred C. Chandler; secretary, Cyrus E. Lothrop; treasurer, Charles H. Hodges.

Work on the Michigan No. 1, the first of the big balloons being constructed for the Aero Club of Michigan, is progressing favorably, and its delivery is looked for about May 15. It will be a 40,000-foot sack, capable of carrying a pilot and three passengers. Meanwhile, members of the club are planning for preliminary flights some time this month, under A. Leo Stevens.

Proposed Reform for Stock Car Races

IN ORDER to insure the participation of bona fide stock cars only, in competitions designed for that class, Windsor T. White, president of the White Company, proposes the adoption of a rule similar to the selling and claiming clauses which are operative in the horse-racing world, with reference to selling races. These clauses provide that the winner shall be sold at auction to the highest bidder over the entered price and that the owner of any contestant in the race may lay claim to any other entry that finishes behind the winner by paying the entered price plus the amount of the first money awarded.

Mr. White says by the adoption of a rule allowing the owner of any car in a race to claim any other car by paying the list price of the claimed entry, that the suspicion which has existed for a long time that "stock cars" intended for racing are specially constructed and prepared would be nullified.

He declares that from the viewpoint of the public there is no good reason apparent why a "stock car" which competes one week in New York, should be rushed by express to New Orleans or Minneapolis to take part in races, if there was not some tangible basis for the public's suspicion.

He believes that the enactment of such a rule as he suggests would have an immediate and beneficial effect upon automobile racing and that its enforcement would mean the discouragement of building specially constructed cars for stock car contests.

Coming Events in the Automobiling World

Apr. 9-16.....Elmira, N. Y., State Armory, Automobile Show, Elmira Chamber of Commerce.
Apr. 11-16.....Harrisburg, Pa., Kelker Bldg., Automobile and Sportsman's Show, Harrisburg Automobile Dealers' Association. B. R. Johnson, Manager.
Apr. 11-16.....Erie, Pa., Meyer Block, Automobile and Motorcycle Show.
Apr. 23-29.....Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.
June 20-July 6....Detroit, Mich., Industrial Exposition, Detroit Board of Commerce.
Jan. 7-14, 1911....New York City, Madison Square Garden, Eleventh Annual Show, Pleasure Car Division, Association of Licensed Automobile Manufacturers.
Jan. 17-24, 1911...New York City, Madison Square Garden, Eleventh Annual Show, Commercial Division, A. L. A. M.
Feb. 13-25, 1911...Chicago, Coliseum, Tenth Annual National Automobile Show, N. A. A. M.

Races, Hill-Climbs, Etc.

Apr. 13-17.....Los Angeles, Cal., Inaugural Meet, Motordrome.
Apr. 30-May 2....Philadelphia Roadability Run to Atlantic City, Quaker City Motor Club.
May 2.....Flag to Flag Endurance Contest, Denver, Col., to City of Mexico.
May 5-7.....Atlanta, Ga., Track Races. Atlanta Automobile Association.
May 9-11.....Harrisburg, Pa., Fourth Annual Reliability Contest to Atlantic City and Return.
May 21-22.....Bay Ridge, L. I., Club's Endurance Contest Around Long Island, Crescent Athletic Club and Long Island Automobile Club.
May 30.....Bridgeport, Conn., Hill-Climb up Snort Hill; Automobile Club of Bridgeport.
June 11.....Wilkesbarre, Pa., Annual Hill-Climb up Giants' Despair, Wilkesbarre Automobile Club.
June.....Cincinnati, Seventh Annual National Reliability Run for Glidden Trophy, through the Southwest.
June.....Worcester, Mass., Hill-Climb up Dead Horse Hill. Worcester Automobile Club.

Foreign Shows and Races

Apr. 2-24.....Turin, Italy, Automobile Show.
Apr. 27-28.....Brooklands, England, Two-Day Meeting.
May 1-Oct. 1.....Vienna, Austria-Hungary, Automobile and Aviation Exposition.
May 25.....The American Cup," Argentina, Sociedad Sportiva Argentina, near Buenos Ayres.
May 28-June 9....St. Petersburg, Russia, Automobile Exhibition.
May 29.....Copa Catalunya, Voiturette Race of the Royal Automobile Club of Spain, near Barcelona.
June 2-8.....Prince Henry (German) Touring Competition.
June 13-18.....Scotland, Scottish Reliability Trials.
June 20.....French Voiturette Race.
June 21.....French Stock-Car Race.
June 22-July 5....Russian Touring Competition, St. Petersburg to Moscow; also Commercial Vehicle Trials.
June 27.....Speed Trials at Kiev, Russia.
July 12-18.....Ostend, Belgium, Automobile Week.
July 20-25.....Boulogne, France, Automobile Week.
Aug. 1-15.....Ardennes, France, Meeting.
Aug. 15-Sept. 15..French Industrial Vehicle Trials.
Aug. 21.....Salon, France, One and Five Kilometer Trials.
Aug. 28.....Mont Ventoux, France, Hill-Climb.

Grand Prize Race Conditions Now Given Out

THE international race of the Motor Cups Holding Company for the Grand Prize of the Automobile Club of America has been announced for October 15, on the Long Island Motor Parkway. The gold challenge cup, valued at $5,000, is the chief award to the winner. All makes of cars are eligible, but no more than three cars of any one make may be entered. The length of the race is the same as the Vanderbilt, 278.08 miles, 22 times around a course of 12.64 miles.

Entrance fees are $1,000 a car, $1,500 for two cars of the same make and $1,750 for three cars of the same make. Regular entries close August 1, but until September 1 special entries may be made at an advance of $250 a car.

On account of the latitude allowed entrants, it is expected that there will be a big field, and under the rules some sort of elimination trials will be held if the number of competitors appears to be unwieldy.

AVIATOR LE BLON IN FATAL ACCIDENT

SAN SEBASTIAN, SPAIN, Apr. 2—The name of Hubert Le Blon has been added to the roll of aeronautic fatalities. He was killed here to-day while making an exhibition flight near the royal palace of Miramar. Owing to the stormy weather he had not been expected to ascend, and only a few persons had assembled to see the start. He was flying at a height of 140 feet when his motor broke down. He attempted to glide to the ground, but the machine was overturned by a cross current and dashed against a rocky cliff. Death was instantaneous.

Le Blon took part in the Vanderbilt race of 1906, and had many friends in America. He took up aviation last Summer as a pupil of Blériot, and distinguished himself at the Heliopolis meet in February by setting a new 5-kilo. record of 4 mins. 2 secs.

QUICK STARTS AT MEMPHIS AERO MEET

MEMPHIS, TENN., Apr. 9—Glenn H. Curtiss lowered his world's record for quick time in starting last Thursday, making the start in 5 4-5 seconds, as against his mark of 6 2-5 seconds, made at Los Angeles. At the same test he failed to break his short-distance starting record of 98 feet. After this flight the aviator took up his wife as passenger for her first ride.

Charles Willard, one of Curtiss's pupils, had engine trouble, and was forced to descend before completing one round. Friday he was still unable to get his machine in good order. J. C. Mars, another of Curtiss's pupils, made several good flights on both days. Friday Curtiss equalled his quick-start record.

AERO CLUB INSURGENTS RENEW FIGHT

The insurgent faction in the Aero Club of America, which brought injunction proceedings against President Cortlandt F. Bishop to prevent voting by proxy and thereby defeat his re-election, renewed their activity last week by the publication of an open letter demanding his resignation. The letter asserts hat owing to President Bishop's poor management America is n danger of losing the international aviation meet, and demands ome radical action to restore public confidence.

NEW AEROPLANE PASSENGER RECORD

CHALONS, FRANCE, Apr. 8—Daniel Kinet, a Belgian, broke the world's record for a flight with a passenger here to-day. With a companion he rose in an aeroplane and remained in the air for 2 hours and 20 minutes. The best previous record was made by Effimoff on a Farman biplane at Mourmelon January 30; his time being 1 hour and 50 minutes. Kinet is a comparative novice in aeroplaning.

AVIATION MEET AT MINNEAPOLIS

MINNEAPOLIS, MINN., Apr. 4—Arrangements for a three-day aviation meet have been completed and the event will take place June 22-25 at the State Fair Grounds. The program includes contests for both speed and distance.

FOR MILE-A-MINUTE STOCK CARS

One of the special features of the National Championship track races at Indianapolis May 30 will be event No. 14, a race the conditions of which have been framed to test the claims made by makers of stock cars that their machines can travel a mile a minute under touring conditions, carrying four passengers.

John A. Wilson, of Franklin, Pa., has donated a cup valued at $150 to the winner of such a race. Under the rules the competing cars will be required to race a mile in one direction and then traverse the same distance in the opposite direction. In order to win the successful car must average at most a mile a minute.

Torpedo bodies and baby tonneaus are barred and the entrants must not rate higher than 50 horsepower, according to A. L. A. M. standards.

FIRST ENTRY IN ATLANTIC CITY RUN

The first entry for the two-day automobile reliability contest from New York to Atlantic City and return, which will be held on May 10 and 11 under the auspices of the Motor Contest Association, was made less than one hour after the official entry blanks were issued, when Mr. Merrill named Lewis Strang as the man who would handle his Pierce-Racine in the contest. Before leaving for Los Angeles, S. M. Butler, chairman of the Contest Board of the A. A. A., granted a sanction for the Jersey contest, and entry blanks have been sent out to a large number of individual automobilists in addition to the firms in the automobile business.

UP-STATE RELAY RUNS PLANNED

SYRACUSE, N. Y. Apr. 9—Automobilists of Syracuse and Central New York generally, are interested in the preliminary plans for a big relay club run, the first time an undertaking on such a scale has been tried hereabouts. The plan is to start from Syracuse on Saturday, May 28, and to carry a message from some well-known person to the autoists of Central New York.

From here the message will be carried to Auburn, to Cortland, to Ithaca, to Watkins, to Elmira, to Owego, to Binghamton, to Oneonta, to Cooperstown, to Richfield Springs, to Utica, to Rome, to Oneida and back to Syracuse.

HILL-CLIMBING MATCH AT ATLANTA

ATLANTA, GA., Apr. 2—As an aftermath of Atlanta's recent hill climb, there will be a match hill climb, best two heats in three, on the Stewart avenue hill next Saturday afternoon. The contestants will be Billy Oldknow in his Buick and W. J. Stoddard in a National.

PRIZE FOR GLIDDEN TOUR RUNABOUTS

Runabouts and miniature tonneau cars entered in the 1910 Glidden Tour will compete for a handsome trophy donated to that class by the Chicago Motor Club. The trophy will be awarded to the runabout or toy tonneau making the best score.

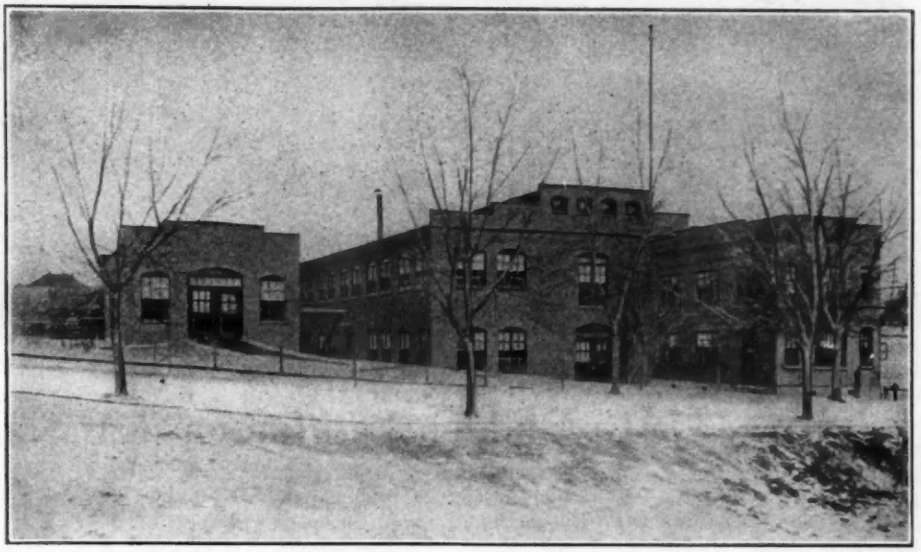
Alden Sampson Merged in United States Motor

TRUCK and commercial car building on a larger scale is indicated in the absorption of the Alden Sampson Manufacturing Company, of Pittsfield, Mass., by the United States Motor Company. The Sampson company has been operating under a license of much breadth and scope and its terms are so framed as to give additional latitude in manufacturing to the U. S. Motor Co.

The Sampson Company was founded by Alden Sampson many years ago. He was a man of wealth and a mechanical trend of mind, and he expended a vast amount of money and energy in prospecting the field of the commercial vehicle. The results of his work have been material and valuable, but when he was on the threshold of realizing them, he died, about a year ago. The active head of the company has been Guy E. Mitchell, general manager.

One of the secrets of the success of the Sampson truck is the fact that it has been kept entirely distinct from pleasure cars. The materials used have been special materials, fitted to the requirements of the truck in contradistinction to the pleasure car.

According to the announcement of President Briscoe, it is the company's intention to manufacture a wide line of commercial vehicles and in conformance with that policy, the Pittsfield plant will be considerably enlarged and improved.



Alden Sampson Plant at Pittsfield, Mass., Which Has Just Passed to U. S. Motor Co.

Auspicious Opening for Elmira's Automobile Show

ELMIRA, N. Y., Apr. 9—What is probably the last of the shows in New York State for this season, opened here this evening in the Third Regiment Armory, to run for a week. The show is directly held under the auspices of the Chamber of Commerce, assisted by the local Automobile Club. The opening was most auspicious, with a large crowd in attendance.

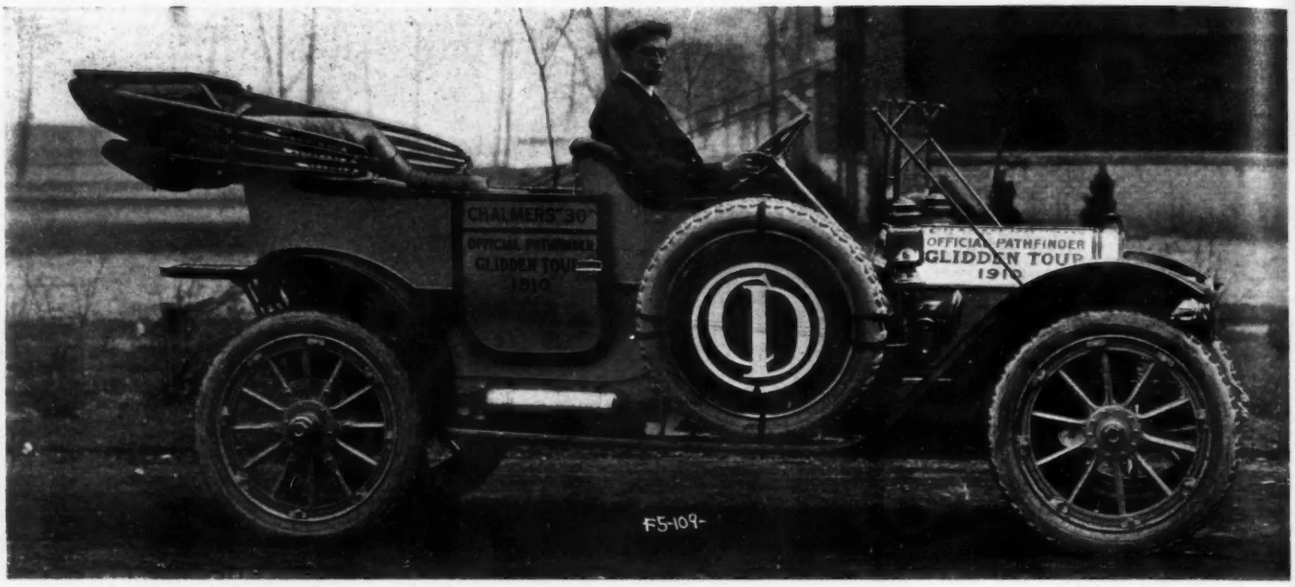
There are thirty exhibitors in all, showing a total of forty cars, with thirty-six different makes represented. In addition to this there is a good showing of accessories, motorcycles and bicycles.

Charles Teasdale of Elmira, is showing for the first time in public an aeroplane of his own invention.

List of Exhibitors:

Chenango Motor Sales Co., Speedwell; L. D. Woodward, Ford; R. C. Pierce & H. K. Spaulding, E-M-F, Flanders "20," Haynes; J. F. Rhoades, Jackson; O. D. Eisenhart, Winton; La France Motor Car Co., Velie, Hudson, Chalmers, Reo; International Harvester Co., I. H. C.; C. W. Bishop Co., Buick; Frank Record, White (gas); Elmira Motor Car Co., Maxwell, Empire, Franklin; Corning Auto Exchange, Peerless; Thomas Motor Co., Thomas; State Line Motor Car Co., Oakland; Roberts & Son, Rambler, Krit, Buffalo wagons; Corning Auto Co., Pierce-Arrow; Southern Tier Motor Co., Marion, Overland, Courier; F. C. Tomlinson, Insurance; J. M. Tillman, Accessories; W. B. Hallock, Clothing; Elmira Arms Co., Accessories; J. F. Izzard, Clothing; C. A. Georgia, Electric Supplies; P. B. Rutan, Motorcycles & Bicycles; D. S. Andrews, Trucks; Barker, Rose & Clinton, Tools & Supplies; C. W. Young, Bicycles; Leon A. Peters, Motorcycles; M. A. Van Brunt, Kellogg Pumps & Pressure Indicators; Roberts & Son, Accessories.

At Elmira's Show—General View on the Main Floor. At the Right, Scene Along One Main Aisle



Chalmers Thirty, Official Pathfinder for the Glidden Tour, Gardham at the Wheel, as It Appeared Before the Start

1910 Glidden Pathfinding Car Starts Trip

OFFICIAL pathfinding for the Glidden Tour of 1910, started Monday from Cincinnati. The pathfinding car, a Chalmers 30, is in charge of Dai H. Lewis. Joseph Gardham is the driver, and Lazarnick, the official photographer, accompanies the expedition.

The course of the tour through Lexington, Ky.; Louisville, Bowling Green, Nashville, Florence, Ala.; Memphis, Helena, Ark.; Little Rock, Texarkana, Dallas, Tex.; Oklahoma City, St. Joseph, Mo.; Wichita, Kan., through Iowa to Chicago, will require twelve days according to schedule, and will be approximately 2,500 miles long.

The tour upon which Mr. Lewis and his companions have started will require considerably more time than the run itself. This is due to the fact that the roads have to be carefully charted and mapped en route. It is expected that about three weeks will be spent on the road.

The selection of Mr. Lewis for this important duty came to him unsought. He is particularly busy at this time of the year with the affairs of the Buffalo Club, of which he is secretary. Four times prior to this year he had charge of the pathfinding trip of the Glidden Tour, and his labor in this respect has brought him much praise.

The Buffalo Automobile Club granted him leave of absence for this purpose on the highest ethical basis. The club realized that the performance of such a mission by one of its officers was a service to automobiledom generally, and was fully cognizant of the honor that must redound to the club for its part in furnishing such an important detail of the big tour.

INDEPENDENT AUTO SHOW ANNOUNCED

The Journal Company, of Troy, N. Y., by C. C. Conant, president, announces that the Eleventh Annual Automobile Show will be held at Grand Central Palace, New Year's Eve, 1910, continuing until Jan. 7, 1911.

According to the literature sent out by the Journal Company the show is intended to afford independent automobile manufacturers an opportunity to interest the motor-buying public. Space will be allotted in the order of the receipt of applications.

Referring to the announcement of an independent automobile show at Grand Central Palace at the opening of next year, Alfred Reeves, manager of the A. L. A. M., had little to say.

"Exhibitors of motor cars and motor accessories at the show outlined," said Mr. Reeves, "will be automatically barred from participation in the Chicago show and other exhibitions under the rules of this association."

CROWDS AT HARRISBURG OPENING

HARRISBURG, PA., Apr. 11—The first annual automobile show under the auspices of the Harrisburg Dealers' Association was opened in Kelker street Hall Saturday, with all space taken and 52 cars, representing 32 makers, on exhibition. The large hall has proved not large enough to accommodate the dealers, and several private displays are being held by agents who were unable to secure floor space.

NEW OFFICERS SELECTED FOR A.C.A.

Officers for the Automobile Club of America were elected Tuesday night at the annual meeting of the organization at the club house, 247 West Fifty-fourth street, New York city. There was only one ticket nominated, which was as follows:

President, Henry Sanderson; first vice-president, John E. Borne; second vice-president, Robert Lee Morrell; third vice-president, Edward Shearson; treasurer, Finis E. Marshall; three governors to serve four years, Dave H. Morris, Albert R. Shattuck and E. H. Gary; governor to serve in place of Cornelius Vanderbilt, two years, Alfred Ely; governor to serve in place of Horace Porter, three years, George Moore Smith.

ECONOMY RUN TO LAKE GENEVA

CHICAGO, Apr. 11.—Sanction has been granted the Chicago Motor Club by Chairman Butler of the contest board of the A. A. for an economy run April 28 over a route from Chicago to Lake Geneva by way of Halfday, a distance of 200 miles.

BENZ-FIAT MATCH RACE DECLARED OFF

LOS ANGELES, Apr. 13.—The match race between the Benz and Fiat cars, Oldfield and De Palma, drivers, has been declared off. The Fiat car broke a piston again, and announcement of the cancellation of the race was made at once.

NEW PIERCE-ARROW FACTORY ADDITIONS

(*Continued from page 709*)

Since the Fall of 1909 ground has been broken almost every month for some additional structure fitting into the total long ago provided by the designers. First to be completed was an addition to Machinery Hall, one story in height and 75 by 204 feet plan. Closely adjoining stands a new L-shaped building, one wing 61.5 by 305 feet and the other 50 by 100 feet, both four stories in height. On the first two floors raw material and some finished stock are stored, and the two upper stories are to be used for the assembling of motors, transmissions, rear axles, carbureters, pumps, steering mechanisms and clutches. The storage floors in this new building release one end of Machinery Hall which has been used for storing of raw material, and this space as well as the side of the hall, heretofore used for inspection work, will be cleared for the installation of new machinery. This will result in a machine room believed to be larger than any other under one roof in any industry in North America.

The upper stories in the new L at the same time place 50,000 square feet of floor space on one level at disposal for painting and assembling of chassis alone. This work has so far been done, together with the assembling of construction units in one great hall, 400 by 122 feet, and the removal of the unit work to the new L therefore serves both for enlargement and improvement of the system.

Two new wings, each 350 by 50 feet and four stories high, are approaching completion and are joined at one end by a building, 40 by 50 feet, three stories high. Added to the adjoining older structures, the whole complex measures a total length of 750 feet, and the new space is to be given over to the body makers, with a view to continuing the company's policy of placing a large number of different bodies, suited for all automobile purposes, at the disposal of motor car users. Not less than 7 1-2 acres of floor space will be available for body building when the new wings are completed.

Other additions to the Pierce-Arrow industrial city on Elmwood avenue are a nickel-plating house, 61.5 by 184 feet, four stories, now in course of construction, an addition to the motor-testing department, 55 by 200 feet, one story high, and an addition to the power house, 51 by 50 feet, one story high, together with a new smoke-stack, 150 feet high, and with the firm's name inlaid in colored brick, so he who motors may read it without stopping.

Two more buildings are planned. One of these will be used for the manufacture of the new heavy motor truck. It will be 184 by 300 feet and four stories, of reinforced concrete like the other new buildings. The other is to be an extension of the office buildings, 68 by 220 feet, and three stories high.

The total floor space of the enlarged plant will reach 1,000,000 square feet or 23 acres. The boiler capacity has been increased 2,000 horsepower, partly by the attachment of "economizers." One new 1,000-horsepower engine has been installed. Most of the new machine tools for the vacated space in Machinery Hall have already been put in place, and the force of 2,600 employees in being daily increased.

ADVANCED METHODS IN NATIONAL PLANT

(*Continued from page 711*)

ground. C, in the same illustration, presents a heavy and well-designed radial drill, which, together with its fixtures and jigs, becomes an important member in the train of machine tools employed in the aluminum crankcase work.

In a general way, the jigs and fixtures as they are employed at this plant, are designed on the same common basis. The idea is to afford to the workman a means by which he will be enabled to take the rough or partially machined parts, place them in the fixtures and proceed with the operations without having to go through the laborious process of setting up the work. Fig. 2 shows one of these fixtures as it is used on a heavy milling machine for the purpose of reaming out the two ends of the connecting rods. The jig G rests on the platen T and the reamer R is guided by the bushing B into the large end of the connecting rod C. The other end of the same fixture has a smaller bushing which registers with the gudgeon-pin end of the connecting rod. These hardened bushings are screwed into the fixture, and by changing the bushings it is possible to use the fixture, first for roughing out, and second for reaming, so that the amount of metal to be cut from the walls of the bore in each case is of equal radial thickness and the tendency of the reamer to back away at some one point in the diameter is thereby eliminated. The fixture is so designed that the workman is not held responsible for the accuracy of the undertaking, because the centers are fixed, and the reamers or other cutting tools are properly sized in the tool room, thus putting this part of the accuracy question up to experts who have no other duty to perform.

As an illustration of a more complex situation reference may be had to Fig. 3, which shows a fixture F on a horizontal boring tool with a platen P, which is provided with a cross feed, and the fixture in this particular case is one which holds the bevel-drive housing H for the rear axle. The illustration so clearly presents the situation that it seems almost unnecessary to go into a further description, excepting to point out that the horizontal boring mill is especially designed for the accommodation of work of this character; the alignment is most thoroughly established and the vertical distance from the face of the platen to the axis of the boring bar is dependent entirely upon the accuracy with which the jig was made. Here again is evidence of a plan which assures the greatest measure of accuracy. It is the accuracy which comes from utilizing toolmakers of accentuated skill in the process of producing the jigs and fixtures, which makes it unnecessary to consider the skill of the machinists who do the regular work, beyond the barest measure, which is involved in the mere use of the fixtures in the regular way, remembering that they cannot be employed, excepting as designed for the work.

POINTERS IN VALVE REPAIR WORK

(*Continued from page 715*)

trouble, and this may be proof of the lack of necessity of adjustments at this point. The ends of the valve stem and the lift were found to be substantially glass hard, and on the whole it seems that on a non-adjustable valve motion is capable of rendering service for at least three years, without seriously discommoding the owner of an automobile. There is no getting away from the fact, however, that when the evil day arrives the problem involved is one which is difficult to surmount. Fig. 8 shows a system for the valve motion in which provision is made for adjusting, and a non-metallic pad is placed in the head of the adjusting stud for the purpose of deadening the sound. The amount of noise generated by this system is relatively slight in view of the use of a smaller diameter roller, which has the good effect of reducing the clearance requirement. It is fairly appreciated in designing quarters that the diameter of the roller is the influencing factor when the amount of the clearance is to be determined.

The very fact that the wear is not equal, and that the valves do not grind down at the same rate, is ample reason for desiring an adjustment, if it is true that adjustments can be so made that they will not rattle loose. It is not easy to provide an adjustment which will serve for a reasonably long time without undoing, and many designers prefer to take their trouble the other way. It might be well to bear in mind, however, that the other way is the method by which the trouble is transferred to the owner of the automobile after the designer gets through with it. If, in the design, the trouble is three years remote, there is not so very much to complain about, but purchasers of automobiles at the present time are trying to reach the conclusion that the life should be more than that as indicated by a 33 1-3 per cent factor of depreciation. Ten per cent should be a large enough depreciation factor in modern manufacturing.

AMONG THE GARAGES

Grabowsky truck, run by the Motor Car Maintenance Company, of New York City, in the service of the New York branch of the Continental Caoutchouc Company, loaded with rims

John W. Bate, designer of the Mitchell-Lewis Motor Company

An organization of garage owners and managers is being discussed with much interest in some parts of Automobile Row. In referring to the possibility of such a movement, Edward G. Koerner, manager of the Pyramid Garage, 36 West Sixty-second street, said that he was in favor of such an organization. Mr. Koerner said that there was too much irregularity in prices of storage and supplies and that better service could be furnished to the motoring public if an agreement could be reached about an equitable price level. A preliminary meeting at which the project will be presented may be called in the middle of April.

There is considerable agitation against an ordinance pending in the City Council relating to the future establishment of garages in Indianapolis. Should the measure become a law, except in a district bounded by Alabama, Georgia and New York streets and Senate avenue, a garage cannot be established in the same square with a church or school building, while in any other square the written consent of a majority of the property owners must be obtained and also the written consent of all persons owning property within 50 feet of the proposed garage.

Uniontown, Pa., is getting right to the front as a user of automobiles. About 200 are now owned in the town. There are four large garages in Uniontown, the Standard on Peter street, the Keystone on Mill street, the Central on South Gallitin avenue and the Uniontown on East Fayette street. It is estimated that fully $700,000 is invested in automobiles and garages.

The Greensburg Automobile Company now has the largest and most complete garage in Western Pennsylvania. The floor space of the company is over three-fourths of an acre and gives it extended show room. W. H. Sharpe is manager, Elmer Turner is sales manager and Curtiss Clawson is floor manager of the firm.

E. D. Crane & Company, of Atlanta, are building a garage in the rear of their present plant at 44 Madison avenue. The new building will be of stone and concrete and will add considerably to the efficiency of the concern in handling both gasoline and electric cars.

The Pilot Garage & Supply Company, of Worcester, which is one of the largest garages in Massachusetts, has made an assignment for the benefit of creditors. It is given out that the liabilities are $20,000 and the nominal assets are between $12,000 and $15,000.

Chauncey R. Benefield, Robert T. Lamb, Gordon Frierson and William Percy have organized and incorporated the P. D. Q. Company, of Shelby County, the company being capitalized at $6,000.

The garage of the Empire Auto Repairs Company at Spokane, Wash., will be ready for occupancy April 15.

It is estimated that the up-keep of motor cars in New York State in 1909 was about $97,000,000, and in the natural order of things it will be considerably more than $100,000,000 in 1910.

The Globe Garage & Auto School, of Pittsburg, has been organized by Ralph F. Worden, D. P. Reighard and A. J. Schmitt of that city and has applied for a Pennsylvania charter.

A modern garage will be erected in Spokane, Wash., by the Empire Auto Repair Company, on Second avenue, near Cedar street. It will be 50 feet wide by 100 feet deep.

F. D. Palmer, 239 West Fiftieth street, will add a line of second-hand cars to his garage and repair shop about April 10 and will take up renting on a larger scale.

At Circleville, the Spangler Automobile Company will soon open a garage on North Court street. The building will cover a half lot and will be two stories high.

Harvey Steel and Craig Humgardner of Punxsutawney, Pa., will build a garage 116 by 62 feet at once and have secured the agency for two well-known cars.

A concrete garage for the North Shore Garage Company, New York avenue, Huntington, L. I., is being built under the direction of Franklin Baylis, architect.

The Portage Motor Car Company, of Akron, O., was incorporated with a capital stock of $5,000 to operate a garage by Albert Buehrle and others.

Joseph C. Strout has bought the lot and building at 242 West Twenty-seventh street, New York city, and will alter the present building into a garage.

A. C. Woodbury, of Springfield, Vt., is building a garage 40 by 48 feet in that city. The improvement contemplates a repair and supply department.

At Massillon the English Motor Car Company has purchased the Loeffler block on South Erie street, which will be remodeled into a garage.

Harry Henderson has opened a new garage on Canal street, Greenville, Pa., and has secured the agency for two well-known cars.

Permit has been issued to the Northern Garage Company, of Philadelphia, to build a $6,000 garage on Cabot street.

The Philadelphia Construction Company has opened a garage at 227-229 Raymond court, Scranton, Pa.

The Washington Garage Company has been incorporated to conduct a garage business in The Bronx.

In Urbana, Ill., a new garage is under construction for the Illinois Motor Sales Company.

The Philadelphia Construction Company has opened a garage at Scranton, Pa.

WITH THE AGENCIES

Large shipment of Studebaker electric delivery wagons, made to the big department store of Gimbel Brothers, New York City, which will use these for delivery exclusively

Emerson Brooks, now president of Rothschild & Company

Boston's great show four weeks ago convinced the Standard Automobile Company that the Hub city needed Paterson "30's" and lots of them. The result was a large contract between that hustling agency and the manufacturers, the W. A. Paterson Company, at Flint, Mich.

Through a deal which was closed recently, the Studebaker branch of Columbus, O., has taken over the business of the Burdell Auto Sales Company, of North Fourth street, Central Ohio agents for the E.-M.-F. and Flanders "20."

The Grout Automobile Company, of Manchester, N. H., has been organized to handle new cars and a general garage business. The company will assume the agency for the Grout car throughout New Hampshire, exclusive of Cheshire County.

Charles E. Riess & Company, New York and New Jersey distributors of the Marion and Overland cars, have entered a 35-horsepower Marion Roadster in the 24-hour race that is scheduled to take place early in May at Brighton Beach.

H. M. Adams, sales manager for the Royal Tourist Car Company, Cleveland has just appointed two agents. These are the Lock Haven Auto Company, Lock Haven, N. Y., and the La Crosse Plow Company, La Crosse, Wis.

The New York allotment of Pope-Hartford cars has been practically sold for this season. At the company's garage it was said that only twenty cars remained to be disposed of. Trade in used cars is reported lively.

H. R. and L. L. Applebaum, agents for the Detroit Electric in Cleveland, have accepted the agency for the Herreshoff car. Applebaum Brothers moved to larger quarters in automobile row April 1.

James E. Graham has secured the Pittsburgh agency for the Coleman automobiles and has established headquarters at 807 Westinghouse building.

The Kittanning Automobile Company has been formed at Kittanning with a capital of $5,000 by James A. McMasters and others of that place.

The Western Sales Agency Company of Cincinnati, was incorporated with a capital of $5,000 by Max S. Goldsmith and others.

The Park Automobile Company, of Johnstown, Pa., has been formed by F. J. and E. L. Erwin and Bruce H. Campbell, of that city.

The Athens Automobile Company, of Athens, O., was incorporated with a capital of $10,000 by A. T. Lawhead and others.

The New England Garage Company at 232 Main street has taken the Hartford agency for the Cutting 40.

The East St. Louis Automobile Company, of East St. Louis, Ill., has taken the agency for the Jackson.

A Franklin agency has been established at Altoona, Pa., with Mozer & Lapp, a new firm in that city.

The Bayless Motor Car Company, of Lexington, Ky., will represent the Jackson in that territory.

The Cooper Automobile Company, of Birmingham, Ala., has taken the agency for the Jackson.

E. L. Beal, of Republic, Mo., will handle the Jackson for 1910.

Brief Personal Trade Mention

Emerson Brooks, for twenty years vice-president of J. M. Quinby and Company, Newark, N. J., has resigned and it is announced that he has bought a half interest in the Rothschild Company of which he will be president and general manager. It is said that the Paris connection will be strengthened and the business field of the company made broader.

Surrounded with floral beauties and in the presence of a large gathering of their friends and relatives, Miss Edythe May Meeks and Charles Ernest Easton, of Munice, Ind., were married recently at the Meeks residence in that city. Mr. Easton is advertising manager for the Inter-State Automobile Company. The young couple will be at home after May 1.

Lazarnick, the well-known automobile photographer, has been appointed to take the pictures on the 1910 Glidden pathfinding trip by the Chalmers Motor Company and the A. A. A. He has served in a similar capacity on five of the six preceding pathfinding trips. This work is particularly important and his past efforts along this line have met with approval.

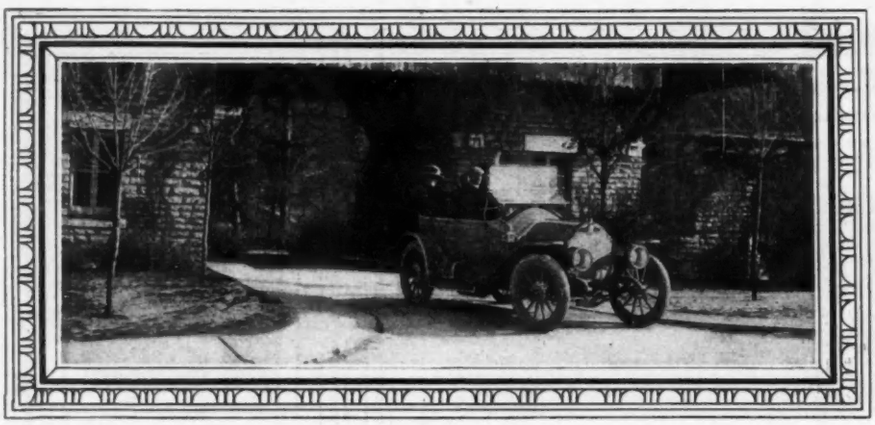
Harvey H. Colbath, manager of the Philadelphia branch of Morgan & Wright, and Helen V. Cadwalader were married in Philadelphia April 7. After the ceremony the bride and groom left on a trip to Washington, D. C., and other points South.

A. D. Youmans, who was lately with Studebaker Brothers Company, of New York, as salesman in their commercial vehicle department, is now connected with Renault Freres Selling Branch, Inc., of New York City, in a similar capacity.

Ralph N. Harris, formerly connected with the Jeffery Manufacturing Company of Columbus, O., and now an attache of the city waterworks department, has applied for a patent on a new automobile bumper.

M. A. Weissenburger, for several years superintendent of large department stores in Cleveland, has accepted a position with the Regal Motor Sales Company, Cleveland, and will assist Manager J. C. Hipp.

A. L. Englander, formerly with the Buick Motor Company at Cleveland, has joined the sales force of the Cook Motor Sales Company, Ohio, agents for the Premier and Reo lines.



Gridley Adams, advertising manager of the Dayton Motor Car Company, in his flush-sided Stoddard-Dayton runabout

H. S. Firestone, president of the Firestone Tire & Rubber Co.

Ground has been broken for a large addition to the plant of the Locomobile Company of America at Bridgeport, Conn., which will mean the employment of 250 more hands and facilities for manufacturing 300 more cars each year. This structure will be erected just east of the present buildings and be known as Factory No. 3. This new building will be four stories high, 150 feet long and 50 feet wide. An addition of one story will also be placed over the forge shop in use at present. The contract calls for completion of the work in four months.

Work has been started on the first of the twin buildings for the Regal Motor Car Company, Detroit, which when finished will occupy an entire block. The structure now under way is 582 by 167 feet, two stories in height, of reinforced concrete, and contains many novel features. Among these is a circular driveway which goes entirely around the interior of the building on both floors, with elevators of sufficient strength to raise a loaded truck.

The Saurer Motor Trucks, organized to manufacture and deal in motor vehicles and accessories, has filed articles of incorporation at the office of the county clerk. The authorized capital is given as $1,000,000, of which $1,500 is paid in. The registered office is at Knollcrest, Hilton Park, West Orange, N. J. The incorporators are: William D. Sargeant, West Orange; George M. Judd and Edward H. Fallows, of New York.

Columbus stockholders in the Oscar Lear Automobile Company, of Springfield, O., have been informed that the receivership was dissolved and the new company, to be known as the Kelly Motor Truck Company, will have entire control of the plant. C. S. Kelly, president of the Commercial Club of Springfield, will be at the head of the reorganized company. The building of additions to the plant will be continued.

The board of directors of the General Motors Company passed a resolution of sympathy for the family of the late Harry G. Hamilton, a member of the board, who died at his home at Pontiac, Mich., last month. Broad tribute to the worth of Mr. Hamilton to the motor industry was paid in the resolution, which was ordered spread upon the minutes.

At a meeting of the stockholders of the Howard Motor Car Company recently the following were elected to the board of directors: Adam Howard, H. A. Pounder, W. J. Geer, H. Gottdiener, B. B. Gill, Frank Faber and Fred K. Beery. The site for the factory, which will be located at Galion, O., will be selected soon.

The Willard-Harlow Manufacturing Company, of Janesville, Wis., has elected these officers: President, R. Willard; vice-president, P. H. Korst; secretary, J. C. Harlow; treasurer. O. W. Athon. The company will manufacture spark plugs, meters, tops, canopies, awnings and other specialties.

New Zealand, Tasmania, and even the Fiji Islands are growing as a field for the automobile. The Hupp Motor Company, of Detroit, recently closed a contract to deliver 200 Hupmobiles to E. G. Eager, of Auckland, New Zealand, in 1910, several of which have been ordered by residents of the distant Fijis.

The James Kidney Motor Truck Company, of Cincinnati, was incorporated recently with a capital stock of $10,000 to manufacture automobiles, motor trucks and delivery wagons. The incorporators were: James Kidney, W. W. Ramsey, W. A. Stuart, Frederick E. Clarke and Joseph Wilshore.

Captain William Mitchell Lewis, president and general manager of the Mitchell-Lewis Motor Company, Racine, Wis., and candidate for Governor of Wisconsin, will make another European business trip at once. He will return May 25, at which time he will open a vigorous political campaign.

The Vickers Auto Car Company, of Coshocton, O., has completed its first car, which will be called the Vickers car, and the test will be made in a short time. Carl Vickers is at the head of the company. The demonstrator is a two-seated runabout with a four-cylinder, two-cycle, air-cooled engine.

At Millersville, Ohio, the Millersville Machine Company is erecting a new plant, just east of the old factory, which will be used to manufacture automobiles. Recently a 25-horsepower runabout has been placed on the market. New machinery is to be added to the present equipment.

The suit of the Hess-Bright Manufacturing Company against the Standard Roller Bearing Company, based upon infringement of patents covering ball bearings, was decided in favor of the complainant company in the United States Court at Philadelphia.

The Kurtzer Radiator Company, of Cleveland, was incorporated with a capital stock of $10,000 to manufacture automobile radiators and other accessories, by Hugo P. Kurtzer, F. N. Dunsford, G. M. Phillips, L. D. Litzler and William F. Kees.

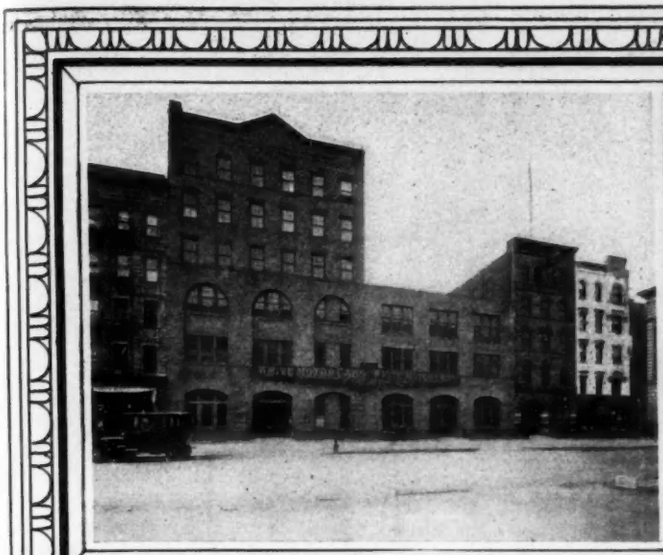
The Hupp Motor Car Company, of Detroit, has increased its capital stock to $250,000. A factory agent of the company has been commissioned to attend the Brussels and Berlin expositions this Summer. He will establish agencies for the car abroad.

The Northway Motor Company, Detroit, will build an addition three stories in height, 225 by 90 feet, with two wings, each 175 by 60 feet. This will involve an expenditure of $100,000, triple the capacity, and permit the employment of 2,000 men.

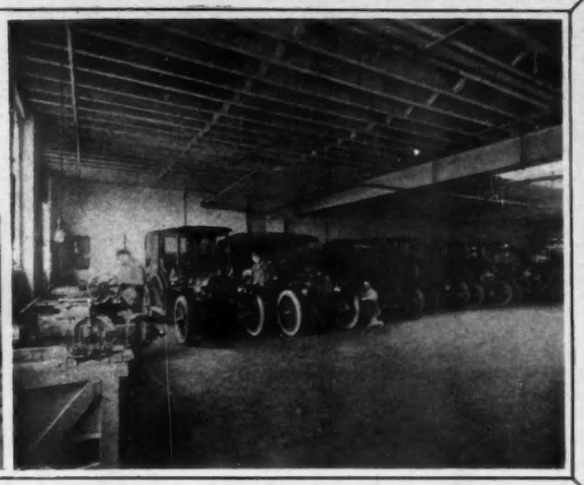
The Schurmeier Motor Car Company, of St. Paul, Minn., recently has been organized with capital stock of $200,000, to manufacture automobiles and other vehicles. Frank I. Whitney was named as president of the company under its charter.

Vice-President and General Sales Manager Horace DeLisser, of the United States Motor Company, was the guest of honor at a dinner tendered by branch managers, salesmen and officials of the Ajax-Grieb Rubber Company at Delmonico's.

The Cleveland Speed Indicator Company, of Cleveland, has been reorganized, and J. W. Hopkins chosen president and G. W. Cook, secretary.



Exterior of the White Garage on West End avenue, New York City, both the six-story and the three-story buildings being utilized



Interior view, being a scene on the third floor, where cars are stored and some repairing is done. The machine shop is on this floor

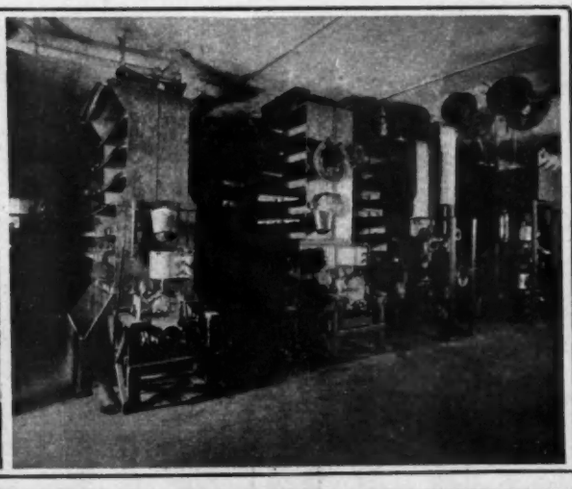
Prominent New York City Garages—White

THERE are many garages in New York City, but among those entitled to first rank, the garage of the White Company, located at 205-213 West End avenue, is as worthy of complete description as any. This consists of two buildings, used as one however, one six stories high and the other but three stories in height. Each building has a basement. The higher building measures 44 feet wide by 93 feet deep, while the lower one has a width of 49 feet and the same depth, all inside figures.

The space is well allotted to the various departments so as to secure the best results with the available floor space, the whole capacity being well in excess of 125 cars live storage and 50 cars dead storage. The number of employees at the present time is in excess of 80, this figure including a staff of bookkeepers.

On the ground floor the whole space of both buildings is given over to live storage, with the single exceptions of the offices and check rooms for material or clothes left in the cars. The basement below is also used for live storage, except 20 feet width clear across the front, in which are the employees' lockers in one building, and the chauffeurs' rooms, in which are the lockers and a well-equipped poolroom. On the second floor the front end accommodates the accounting department, the one building the stockroom, and the other has live storage for 30 cars. Going on up, the fourth and fifth floors are exclusively dead storage, barring only a small testing room in the rear of the fourth, which also communicates with a testing room on the roof of the smaller building, where the generators are tested.

Machine shop of the White Garage, located at the front of the third floor, and well equipped with machine tools and workmen



View in the stock rooms on the second floor, showing the large number of White parts on hand and the orderly arrangement

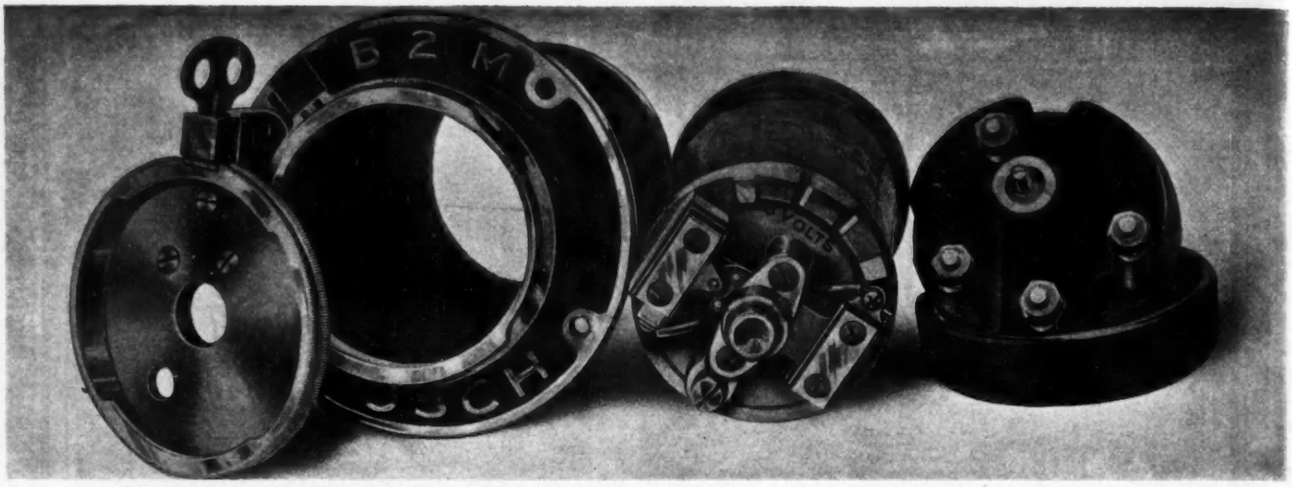


Fig. 1—Parts of the synchronous coil of Bosch Dual Ignition System dissembled to show construction.

Bosch System of Dual Ignition for Automobiles

SOME years ago, in an endeavor to give their cars greater reliability, several automobile manufacturers equipped their engines with two complete systems of ignition. This practice did not become general, however, for through the heavy carbon deposits from the oils then in use, the lack of adaptability of the plugs for the service, and through individual characteristics of the engines, the set of plugs not in use showed a tendency to become foul and was not capable of operating when the necessity arose. The practical method of overcoming this difficulty was to arrange for both magneto and battery ignition, with a single set of plugs, and this was accomplished by the production of the Bosch "Dual" System.

In the Bosch "Dual" System, the magneto generates its own direct high tension current, while the battery circuit is entirely distinct, and utilizes a separate coil, but with individual breaker.

Except for the distributor and plugs, the systems are independent, with the result that the ignition will not be interfered with by an accident to either. On engines where but one spark plug location can be provided, and a timer drive cannot be arranged, the Bosch "Dual" System is producing results.

Recent years have brought great improvements in oils and spark plugs, with the result that ignition systems previously judged impracticable are to-day giving satisfactory results. Certain automobile manufacturers, who for technical and personal reasons, favor the use of two independent systems, have proved that under modern conditions, such an arrangement is entirely practical for engines in which a timer drive and location for a second set of spark plugs can be provided.

The Bosch battery system is used in connection with any of the standard Bosch magnetos, and consists of a combined timer and distributor, and a synchronous coil of special construction.

Fig. 1 illustrates the parts of the synchronous coil, which may be withdrawn by the removal of a single screw; these parts are the housing, the brass cover, the synchronous coil itself, the stationary switch plate, and the rear cover that protects the connections. The synchronous coil is similar in every way with the armature of the magneto, so that there is no difference in the ignition that they produce. The windings are of heat-proof enameled wire, the layers being insulated with a special fabric. The magnetic field is rendered more than usually complete by the use of laminated and divided soft iron, end-plates. Built into the lower part is a heavy fibre block in which are imbedded the movable switch contacts, and in operating the switch, the entire synchronous coil is rotated inside of its housing. The switch presents four combinations; the off position, and three running positions which permit operation on the battery alone, on the magneto alone, or on the battery and magneto, together with both sets of spark plugs in use.

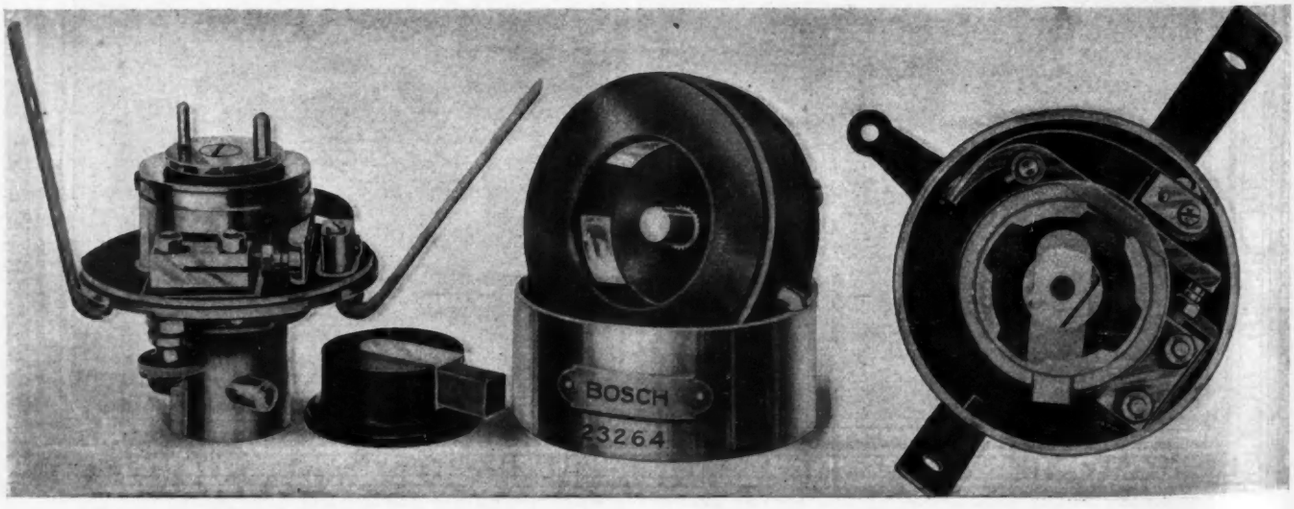


Fig. 2—Timer-distributor parts, partially dissembled. Fig. 3—Contact breaker and cam, with operating lever of sheet metal